

## 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.

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

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

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

### 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:**

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## 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
<b>Bronchospasm (Severe Allergic Reaction)</b>	Epinephrine	$\alpha$ - and $\beta$ -adrenergic receptor agonist	Autoinjectors or preloaded syringes, ampules; 1:1,000 solution subcutaneously, intramuscularly or sublingually; adults, 0.3 milligram; children, 0.15 mg
<b>Mild Allergic Reaction</b>	Diphenhydramine	Histamine blocker	50 mg intramuscularly; 25 to 50 mg orally every three to four hours
<b>Angina</b>	Nitroglycerin	Vasodilator	Sublingual tablet: one every five minutes up to three doses; translingual spray: one spray every five minutes up to three times
<b>Bronchospasm (Mild Asthma)</b>	Bronchodilator such as albuterol	Selective $\beta_2$ - adrenergic receptor agonist	Two or three inhalations every one to two minutes, up to three times if needed
<b>Bronchospasm (Severe Asthma)</b>	Epinephrine	$\alpha$ - and $\beta$ -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
<b>Hypoglycemia</b>	Glucose, as in orange juice	Antihypoglycemic	If the patient is conscious, ingest
<b>Myocardial Infarction</b>	Aspirin	Antiplatelet	One full-strength tablet (165-325 mg) chewed and swallowed
<b>Almost Anything</b>	<b>Oxygen</b>	<b>Respiratory Support</b>	<b>Ad Lib</b>

### #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). IV give 0.5-2.0mg (0.5ml-2.0ml) depending on severity of hypotension, titrate to effect repeat in 2 minutes if needed. IM give 0.3mg (0.3ml) repeat in 10-20 minutes as needed.

### Other Notes or Questions to Ask:

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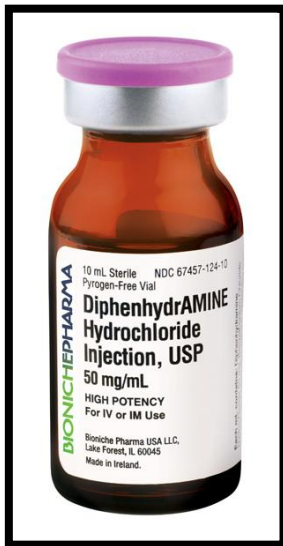
### #1: EpiPen Instead??

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 (Benedryl) 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:**

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- ✓ 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 O<sub>2</sub> or O<sub>2</sub> with N<sub>2</sub>O
3. Chew one aspirin tablet (81mg or 325mg)
4. Call 911
5. Terminate appointment

## M.I. "Heart Attack"



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

~~Morphine for pain control  
 O<sub>2</sub> Administration  
 Nitroglycerine 1 dose q2min 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 (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.**

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#ixzzogfLoHNbP>

### **#4: 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 A<sub>2</sub>, via acetylation of platelet cyclooxygenase, thus inhibiting platelet aggregation; has antipyretic, analgesic, and anti-inflammatory properties.



### **Other Notes or Questions to Ask:**

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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.

**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.**

**#5: Oxygen**

**Bag-Valve Concentrations:**

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



**#6: Albuterol Inhaler (bronchodilator)**

- ✓ Uses: Used during acute asthma or Anaphylaxis to reduce or control bronchospasm.
- ✓ Pharmacology: A  $\beta_2$ -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.
- ✓ 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.



**Other Notes or Questions to Ask:**

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- ✓ 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!



## #7: Glucose (for hypoglycemia)

**How to Treat Low Blood Sugar (Hypoglycemia)**

1.  Eat/Drink 15 g Carbs
2.  Wait 15 Minutes
3.  Check Blood
4.  Less than 70 mg/dl? Repeat Steps 1-4

 **Diabetes** FORECAST



15g Carbs = 4 ounces of a non-diet carbonated beverage or juice, 3 glucose tablets, 1 serving of glucose gel

Other Notes or Questions to Ask:

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### **#8. Flumazenil (Romazicon in U.S., Anexate in Canada):**

Flumazenil, a nonspecific competitive antagonist of the benzodiazepine receptor, is used for reversal of benzodiazepine-induced sedation, conscious sedation, and overdose. It binds to GABA-receptor sites, but has no agonist activity. In the emergency room it can quickly confirm a clinical diagnosis, thereby obviating the need for time-consuming and expensive interventions. In the dental office, with patients undergoing conscious sedation with benzodiazepines, it speeds return to baseline alertness in emergency situations.

It is not recommended for routine reversal as seizures and cardiac dysrhythmias can occur with flumazenil administration, and although the majority of these effects are well tolerated, fatalities have been reported. Coingestion of drugs with proconvulsant properties is associated with an increased risk of seizures, presumably due to loss of the benzodiazepine's protective anticonvulsant effect when the antagonist is administered. Combined overdose of benzodiazepines with tricyclic antidepressants accounts for 50% of these seizures. Coingestants possessing prodysrhythmic properties, such as carbamazepine or chloral hydrate, may increase the likelihood of cardiac effects by a similar mechanism.

Because the mechanism of action is specific to the benzodiazepine receptor in the central nervous system, other medications that work via this receptor can also be reversed with this antagonist. Examples include zolpidem (Ambien), zopiclone (Imovane), eszopiclone (Lunesta) and zaleplon (Sonata, Starnoc).

#### **Contraindications:**

- **Known hypersensitivity to benzodiazepines**
- **Patients with known seizure disorders treated with a benzodiazepine**



#### **Other Notes or Questions to Ask:**

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## Flumazenil

✓“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

## Flumazenil

- ✓“Clinical trials using flumazenil to reverse the CNS depression associated with intravenous diazepam sedation for third molar extractions have demonstrated its efficacy.”
- ✓“Although intended for intravenous administration in 0.2 mg increments up to 1 mg, it may be injected submucosally as well.”

Dionne R, Phero J, Becker D; Management of Pain and Anxiety in the Dental Office. WB Saunders 2002;9:135

The initial adult dose of flumazenil is 0.2 mg given intravenously over 30 seconds. A second dose of 0.2 mg may be given, followed by 0.2mg doses at 1-minute intervals, to a total of 1mg in twenty minutes. Most patients will respond to less than 1 mg. In children, the initial dose is 0.01 mg/kg. Because the duration of action of flumazenil is short (0.7 to 1.3 hours), re-sedation occurs in up to 65% of patients and requires either re-dosing or continuous infusion (0.25 to 1.0 mg/hr).

In summary, flumazenil should be used for selected patients with significant symptoms from a known benzodiazepine overdose and not routinely used in patients with altered mental status. Other points to note are:

## Flumazenil

✓“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; 2000;22:6

- Insoluble in water
- Slightly soluble in acidic solutions
- Dilute concentration of 0.1mg/mL
- 5mL and 10mL vial
- One hour duration (triazolam’s half-life is about 2 hours so patients could re-sedate)
- Can be given sublingual in the canine to first molar area, 2-3 mm under the mucosa, not in the midline
- Buy the 5mL vials and be aware of expiry dates!

**Other Notes or Questions to Ask:**

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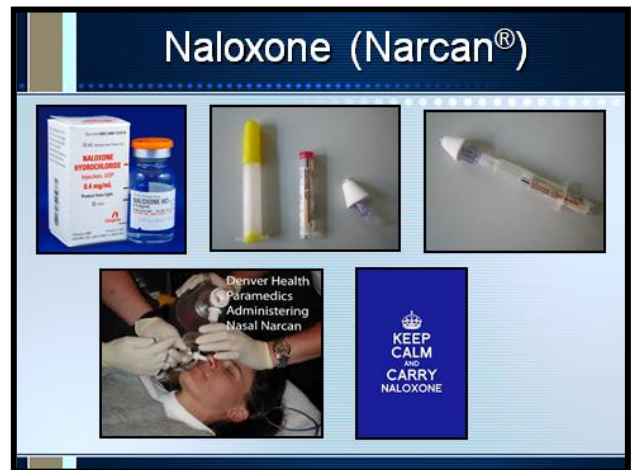
## #9. Naloxone (Narcan®) – Narcotic Antagonist

### 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



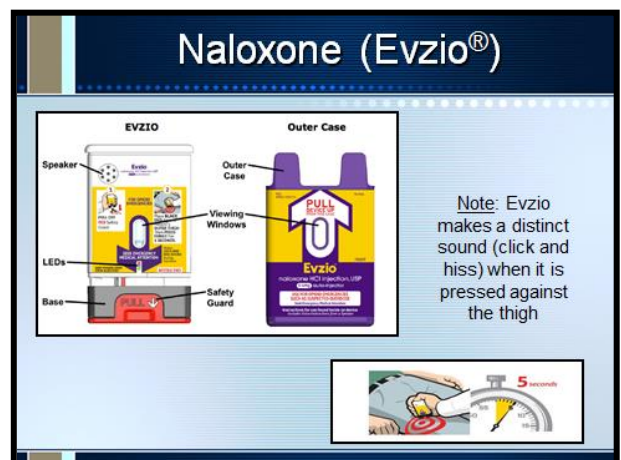
*Rando J, et al. Intranasal naloxone administration by police first responders is associated with decreased opioid overdose deaths. Am J Emerg Med. 2015 Sep;33(9):1201-4.*

### 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 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



### Other Notes or Questions to Ask:

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- 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.*

**Should I Have Other Drugs?**

- Midazolam (Versed®)?
- Flumazenil (Romazicon®)?
- Nitrous Oxide?
- Corticosteroids?
- Aromatic Ammonia?
- Naloxone (Narcan®)?
- Atropine (Required in CA)?

**Do Not Get Yourself Locked Into A Serious Drug Collection!**

**Other Notes or Questions to Ask:**

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