

Anesthesia Pearls: Drugs Every Dentist Should Know, Part 1

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There are drugs many dentists keep in our emergency drug boxes, which we may remember talking about in dental school, or at a continuing education meeting. Many of these drugs are used in the Advanced Cardiac Life Support protocols, or may even be found in the emergency medical kit on board an aircraft.

It is important for us to be familiar with these drugs, for we may have to use them one day to save a patient's life, before emergency help can arrive.

The following material details pertinent information for many of these common emergency drugs. Please keep this handy for future reference. Also, please consult one of the references at the end of this article for additional information.

1. Oxygen – Oxygen is probably the most familiar and easy to use drug in the dentist's arsenal. Oxygen can provide instant benefits to the patient during an emergency, since the body's vital organs each require a supply of oxygen to carry on aerobic metabolism. There must also be a method to administer positive pressure breaths, if the patient is not breathing deeply or not breathing at all, with the aid of a disposable mask into which one can blow or apply a self-inflating ambu bag.^{1(p69)}
2. Acetaminophen (APAP) – A relatively potent analgesic, which works by strong central inhibition of prostaglandin synthesis. APAP has antipyretic properties, and does not possess the platelet inhibition properties of Aspirin.^{2 (p 253-254)}
3. Albuterol – There have been three receptors identified in the sympathetic nervous system [the system of epinephrine, norepinephrine, and dopamine]. Alpha₁ stimulation causes vasoconstriction. Beta₁ stimulation causes an increase in heart rate. Beta₂ stimulation causes bronchodilation. Albuterol is a synthetic Beta₂ agonist used for patients with sudden acute asthma onset. The preferred way to administer this medication is by exhaling fully, then by drawing in the medication with a deep breath, and then holding that breath so that the medication has enough time to contact the tissues of the lung. The medication may be repeated if the initial dose has not fully relieved the spasm, spaced 1 to 5 minutes from the initial dose. Asthma (or bronchospasm), has been described by some as bronchial fibrillation. The lung tissues just fibrillates, like fibrillating heart muscle.^{2,3}
4. Aminophylline – This drug is Theophylline in complex with ethylenediamine to increase its solubility. It is an inhibitor of the enzyme phosphodiesterase. Phosphodiesterase catalyzes the hydrolysis of cyclic AMP (adenosine monophosphate). Now cAMP can accumulate, which causes bronchodilation.²
5. Ammonia inhaler – If you have ever smelled potent ammonia, you know the powerful noxious stimulant effect it can have on a patient who has fainted (also know as a vaso-vagal reaction due to stimulation from the vagus nerve).
6. Aspirin 325mg – We are all familiar with the analgesic effects of aspirin, and all of the many analgesics that have replaced aspirin over the years. So why is aspirin still found in an emergency kit? It is because of aspirin's extremely important role as a therapy for patients experiencing angina and/or acute myocardial infarction. The combination of Aspirin and Oxygen may help save the patient some cardiac muscle.^{1(p56),2}

7. Atropine 0.4mg/ml IV or IM – Is classified as an anticholinergic drug. Acetylcholine is the neurotransmitter released from the parasympathetic nervous system. The parasympathetic nervous system acts as the opposite effect (decrease in heart rate, decrease in blood pressure) to the sympathetic nervous system (increase in heart rate, increased blood pressure). Atropine (0.4 mg) is given intravenously for patients with slow heart rates and a low blood pressure. Many times this is caused from vagus nerve stimulation (cranial nerve X).^{2(pp238-242)}
8. Dextrose 5%(50mg/ml), Dextrose 50% for intravenous (500mg/ml), Glucose 15 (15gm tubes), Glucose Gel(contains 40% [400mg/ml] dextrose), Table Sugar – Used for the immediate treatment of acute insulin reaction (too much insulin), or hypoglycemia.^{4(p2516), 5}
9. Diazepam (Valium) 5mg/ml – A long-acting benzodiazepine. Used to treat anxiety, or provide sedation, but is found in the emergency drug kit because it is also a good anticonvulsant for people experiencing a seizure.^{3(pp78-80)}
10. Diphenhydramine (Benadryl) 50mg –Blocks the effects of histamine at the H₁ receptor. Useful for a person experiencing an acute allergic reaction, skin itching (pruritis), or bronchospasm. Also provides sedation. Available in oral doses.²
11. Ephedrine 50mg/ml diluted to 5 mg/ml –Is a synthetic sympathomimetic. Used to increase both heart rate and blood pressure in a patient, due to stimulation of the release of norepinephrine. Is used to increase blood pressure in the pregnant patient because it does not greatly alter uterine blood flow.^{2 (pp270-271)}
12. Epinephrine – 1:1,000, 1:10,000 A sympathetic drug used in Advanced Cardiac Life Support. Used in a patient with asystole (no detectable pulse or electrocardiogram). Used in patients with life-threatening allergic reactions.^{2(pp264-267)}
13. Lidocaine – Is used intravenously to treat cardiac dysrhythmias such as ventricular premature beats in unstable patients in the operating room. Lidocaine is also used intravenously for patients in cardiac arrest with ventricular fibrillation (vfib) or in ventricular tachycardia (VTach), and is also used for stable (awake patient, with a blood pressure) VTach. The dose is 1mg/kg to 1.5mg/kg.^{1(p67), 2(p332), 3(p179), 6(pp83-84)}
14. Naloxone (Narcan) 0.4mg/ml given with a tuberculin syringe 0.1ml titrated to effect – Is a pure opioid antagonist. Reverses the respiratory depression, sedation, and hypotension associated with narcotic overdose. If the person has received a narcotic for pain, there will be a rebound of high blood pressure, and increased heart rate due to the pain they are now experiencing due to the reversal by Naloxone.^{3(pp242-244)}
15. Phenylephrine (Neosynephrine) 10mg/ml diluted twice to 100µg/cc for IV administration – Used to increase blood pressure in a patient with a rapid heartbeat and low blood pressure. Produces pure α₁ stimulation which causes vein constriction resulting in an increased blood pressure and a reflex decrease in heart rate.^{2(pp272-273)}
16. Nitroglycerin tablets, also available as Nitrolingual spray – Administered sublingually as the tablet or spray for angina pectoris (chest pain) caused by reduced blood flow to the heart muscle, due to atherosclerosis or vasospasm of the coronary arteries.^{2(pp322-325)}
17. Phenargan(promethazine) 25mg or 50mg/ml – Another H₁ histamine receptor antagonist (see diphenhydramine). Causes sedation and anti-motion sickness. Used for allergic reactions, sedation, and as an antiemetic. Can be used with epinephrine for anaphylactic reactions after the control of the acute symptoms of the anaphylactic reaction.^{4(pp1290-1292)}

18. Romazicon(flumazenil) 0.1mg/ml – The only available intravenous antagonist to the effects of benzodiazepines (such as Versed/midazolam, Valium/diazepam, Ativan/lorazepam, etc.) Antagonizes the sedation, the impairment of recall, and the ventilatory depression caused by benzodiazepines. Administered slowly i.v. in 0.2mg doses, spaced one minute apart, up to a total dose of 1mg.^{4(pp2923-2926)}
19. Sodium Bicarbonate 8.4% in a bristoject syringe – Used intravenously for hyperkalemia(excess potassium). Used for acidosis in diabetic ketoacidosis, drug overdose from tricyclic antidepressants, cocaine, diphenhydramine(benadryl), or aspirin. Is given after a prolonged successful cardiac arrest resuscitation event, in which spontaneous circulation is resumed and adequate ventilation is being maintained. The dose is 1 mEq/kg.^{1(p71, 106)}
20. Solu-cortef(hydrocortisone) 100mg/2cc and Solu-medrol(methylprednisolone) 40mg/ml– Steroids can be given to patients as an anti-inflammatory. If given for a period of time, the body does not immediately meet its needs, and replacement steroids must be given to make up this deficiency. If a patient has been on long-term steroid use, a crisis can be precipitated if the patient is subjected to a stressful situation, such as the dental chair. Then, either of the corticosteroids can be given to cover the episode. Solu-medrol is 6 times more potent than Solu-cortef.^{3(pp416-417), 4(pp2005-2006,2784-2786)}
21. Talwin (pentazocine) 50mg – An analgesic, equivalent to 60mg of codeine. Also has sedative properties. Administered 1 tablet every 3-4 hours.^{4(pp3012-3013)}
22. Tigan (trimethobenzamide) – Available as capsules (300mg), suppositories (100mg for pediatric use, and 200mg for adult use), and injectable (100mg/ml in a 2ml vial). Used as an antiemetic, especially for postoperative nausea and vomiting. Can cause drowsiness. Do not forget to unwrap the suppository from the wrapper before administration to a patient!^{4(pp2185-2186)}

The purpose of this article was to familiarize the dentist with the medications that can be seen in dental office emergency drug kits, or may be found in an Emergency Airline Medical Kit. The author is not responsible for the dentist's use of the drugs mentioned. Please consult a textbook of Pharmacology, or a Physician's Desk Reference³ (PDR) for the manufacturer's specific recommendations.

1. American Heart Association. *2000 Handbook of Emergency Cardiovascular Care for Healthcare Providers*. Deerfield, Illinois. WorldPoint ECC, Inc.; 2000.
2. Stoelting RK. *Pharmacology and Physiology in Anesthetic Practice*. Third edition. Philadelphia: Lippincott Williams, & Wilkins; 1999.
3. Omoigui S. *The Anesthesia Drugs Handbook*. Second Edition. St. Louis: Mosby; 1995.
4. *The Physicians Desk Reference*. 57th Edition. Montvale, New Jersey: Thomson Healthcare; 2003.
5. American Diabetes Association. At <http://www.diabetes.org/main/type1/medical/hypoglycemia/hypoglycemia.jsp>. Accessed April 30, 2003.
6. American Heart Association. *ACLS Provider Manual*. WorldPoint ECC, Inc.; 2000.