



COLLEGE OF NATUROPATHIC PHYSICIANS OF BRITISH COLUMBIA

Emergency Medical Kits (Contents and Information)

Outline

- Purpose of EMK
- Contents of EMK
- Review:
 - Pharmacology
 - Indications
 - Dosages
 - Side Effects
 - Contraindications

EMK Purpose and Requirements

- Purpose:
 - to enable response to a range of emergency medical conditions which may occur in the office
- Requirements:
 - all contents to be regularly checked and products kept in date
 - organized
 - available for immediate use

Contents of the EMK

All registrants, including those who do not have prescriptive authority, must have:

- Oxygen, any grade, for inhalation via mask or cannula
- An Epi-Pen (non-prescription)
- Diphenhydramine for oral use, either tablets or syrup (non-prescription)
- Glucose tabs or equivalent

Registrants who have prescriptive authority must also have:

- Epinephrine and its salts for injection
- Diphenhydramine for injection – either an Epi-Pen or epinephrine ampoules
- Nitroglycerin, immediate release sublingual tablets or sprays
- Salbutamol metered dose inhaler
- Smelling Salts

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Pharmacology of Histamine

- 'biogenic amine'
- stored in basophils and tissue mast cells
- role in inflammatory and allergic reactions
- tissue effects:
 - bronchoconstriction
 - increased intestinal peristalsis
 - dilation & increased permeability of capillaries
 - gastric mucosa: (+) parietal cell acid secretion (H2)
 - CNS: neuromodulator
- most histamine antagonists also block other receptors
- H1 histamine antagonists:
 - symptomatic relief of allergies (e.g. Benadryl)
 - antiemetic (e.g. Gravol)
 - OTC sedative (e.g. Somnex, Nytol)

H1 Antihistamine Side Effects (1st Generation):

- sedation
- impaired muscle coordination
- anticholinergics effects:
 - dry mouth
 - constipation
 - urinary retention
- 2nd generation agents are generally void of these side effects but are not considered optimal for stat use during anaphylaxis

Diphenhydramine or 'Benadryl®'

- Pharmacology:
 - type 1 antihistamine (H1)
 - direct binding to histamine receptors via competitive inhibition
- Availability:
 - tablets: 25mg, 50mg
 - oral syrup: 6.25mg/5mL
 - chewable tablets: 12.5mg
 - parenteral: 50mg/mL
 - cream: 2% w/w
- Dosing: Maximum 4 doses/day
 - Oral adult: 25 to 50mg q6 to 8hr
 - child (6 to 12): 6.25 to 12.5mg (5 to 10mL)
 - infant (2 to 5): 6.25mg (5mL)
 - pediatric (<2): 3.125mg (2.5mL)
 - i.m: 0.5-1mL q6 to 8hr
- Precautions:
 - CNS depressant: avoid other depressants, like alcohol or sedatives

- atropine like effect: use caution in asthma, increased intraocular pressure, hyperthyroidism, cardiovascular disease or hypertension
- Side Effects:
 - drowsiness
 - dizziness
 - dry mouth
 - nausea
 - nervousness
- Warnings:
 - narrow angle glaucoma
 - stenosing peptic ulcer
 - pyloroduodenal obstruction
 - symptomatic prostatic hypertrophy
 - bladder neck obstruction
 - Topical:
 - do not use on chicken pox, measles or extensive areas of skin
 - Infants and Children:
 - overdosage may cause hallucinations, convulsions and death
 - may produce sedation or excitation

Nitroglycerin

- Pharmacology:
 - ester of nitric acid & polyvalent alcohol (glyceryl trinitrate)
 - organic nitrates are pro-drugs
 - denitration liberates nitric oxide (endothelium derived relaxing factor)
 - relaxes vascular beds, venous > arterial
 - therapeutic hemodynamic consequences:
 - decrease preload (venous return, ventricular volume)
 - decrease afterload (arterial)
 - decrease cardiac work
 - increase O₂ balance
 - prevents spasm of larger coronary arteries
- Availability:
 - sublingual tablets: 0.3, 0.6mg
 - sprays: 0.4mg per spray
 - transdermal patch: 0.2, 0.3, 0.4, 0.6, 0.8mg
 - ISDN: 10mg, 30mg
 - ISMN: 60mg
- Dosing:
 - 1 or 2 doses sublingually stat; if chest pain continues, repeat every 5 minutes to a maximum of 3 doses
 - if chest pain continues go to Emergency or call 911
 - prophylaxis: 1 dose taken 5 to 10 minutes prior to strenuous activity
- Uses
 - acute symptomatic relief of angina pectoris

- continuous use causes loss of efficacy which can be avoided if a daily ‘nitrate free’ period is maintained (for patch use)
- tolerance develops with continuous nitrate use. Unlikely with stat/prn dosing
- efficacy is restored with a 12hr nitrate-free period
- Side Effects
 - headache from cerebral vessel dilatation
 - excessive dosages:
 - hypotension
 - reflex tachycardia
 - circulatory collapse
- Nitrolingual pumpspray
 - hold upright. Do not shake.
 - ‘prime’ prior to first use (3 sprays)
 - ‘reprime’ if not used within 14 days (1 spray)
 - angina attack: 1 or 2 sprays on or under the tongue. Do not inhale. Dosage may be repeated at 5 or 10 minute intervals.
- Nitrostat Tablets
 - dissolve tablets sublingually or in buccal pouch
 - repeat dose every 5 minutes (max 3 doses)
 - repeated opening of container will diminish the efficacy of tablets
 - discard cotton
 - keep in original container, protected from light
 - once opened, the bottle must be replaced after 3-6 months (depends on manufacturer)
 - ❖ stinging/tingling when tablet placed under the tongue does not indicate tablet potency
- Contraindications / Precautions:
 - early MI: long-acting forms (causes XS hypotension)
 - hypotension
 - uncorrected hypovolemia (may precipitate shock)
 - head trauma (increases intracranial pressure)
 - keep away from heat
- Drug Interactions:
 - Alcohol: additive hypotensive effect
 - Ergot alkaloids: negate effect
 - Heparin: heparin resistance. Monitor INR
 - Hypotensive agents
 - Salicylates: ASA>500mg may decrease Nitrate metabolism, increasing side effects
 - ❖ Sildenafil (Viagra®)
 - concurrent use may cause severe hypotension, loss of consciousness, heart attack or death

Oxygen

- Availability

- Medical O2: 99.9%
- Technical: 95-98%
- Use
 - assist breathing to increase O2 saturation of hemoglobin
- High Flow (> 10L/min)
 - All short of breath patients
 - hypoxia
 - artificial respiration or CPR being performed
 - Unconscious / reduced consciousness (GCS<13)
 - Shock of all kinds
 - hypovolemia
 - anaphylactic
 - septic
 - neurogenic
- Low Flow
 - Emphysema (nasal cannula)
 - try successive flow rates x 2 min each
 - talk to the patient
 - ‘what would you normally do?’
- Side Effects:
 - drowsiness from excess flow rate
 - flow rate 6L = ambient air
 - flow rates < 6L ‘hypoxic’
- Contraindications:
 - hyperventilation
 - emphysema: CO2 does NOT trigger next breath

Autonomic Nervous System

- 2 Divisions:
 - sympathetic
 - parasympathetic
- ANS + endocrine system controls the internal environment
 - adjust internal organ function to the changing needs of the organism
 - neural control permits quick adaptation
 - endocrine system provides for long-term regulation of functional states
 - operates largely beyond voluntary control
 - functions autonomously
 - central components: hypothalamus, brain stem & spinal cord
- Sympathetic Division:
 - purpose:
 - perceive external states
 - target appropriate body movement
 - ❖ e.g. the means by which the body achieves the state of maximal work capacity required for flight or fight situations:

- vigorous skeletal muscle activity
- adequate supply of oxygen, nutrients and blood flow to skeletal muscles
- cardiac rate and contractility enhanced
- narrowing of splanchnic blood vessels diverts blood flow to skeletal muscles
- propulsion of intestinal contents is slowed: peristalsis diminishes and sphincter tone increases: digestion is dispensable & counterproductive to escape
- bronchi are dilated: increased tidal volume & alveolar O₂ uptake
- sweat gland activity increased
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Epinephrine or 'Adrenalin®'

- Pharmacology
 - secreted at the second neuron of the sympathetic NS
 - this neuron branches out & each branch makes contact with several cells
- Effects of Sympathetic Stimulation
 - CNS - increase drive , increase alertness
 - Eyes - pupil dilation
 - Saliva - little, viscous
 - Bronchi - dilation
 - Heart - increase rate, increase force, increase BP
 - Skin - perspiration
 - Fat Tissue - lipolysis, fatty acid liberation
 - Liver - glycogenolysis, glucose release
 - GI Tract -decrease peristalsis, increase sphincter tone, decrease blood flow
 - Bladder - increase sphincter tone, decrease detrusor muscle
 - Skeletal Muscle - increase blood flow, increase glycogenolysis
- Adrenoreceptor Subtypes (4)
 - alpha1, alpha2, beta1, beta2
 - agonists mimic the effect of naturally occurring catecholamines
 - different adenoreceptors are distributed according to region and tissue
 - norepinephrine acts at alpha & beta receptors
 - *'most potent alpha receptor activator'*
- Uses:
 - respiratory distress from bronchospasm
 - anaphylaxis or severe allergic reaction (angioedema, urticaria)
 - prolong the action of infiltration anesthetics
 - cardiac effect may be useful in restoring normal cardiac rhythm esp. ventricular fibrillation or pulseless ventricular tachycardia

- Availability:
 - ‘Epi Pen’ 2mL of 1:1000 solution, delivers 0.3mg per injection
 - ‘Epi Pen JR’ 2mL of 1:2000 solution, delivers 0.15mg per injection
 - parenteral solution: 1:1000 (1mg/mL) in isotonic saline 1mL ampoules or 30mL multidose vials
 - topical solution: 1:1000, 30mL
- Dosing:
 - im or sc: 0.2 to 2mL of 1:1000 solution (sc is preferred; avoid buttock)
 - cardiac arrest: slow iv (0.5-1mg diluted to 10mL in 0.9% NaCl given q10min) alternating with electroshock (with CPR)
 - pediatric bronchial asthma: 0.01mL/kg (max 0.5mL) q4hr prn
- Side Effects:
 - transient and minor at therapeutic dosages:
 - anxiety
 - headache
 - fear & palpitation
 - repeated injections at the same site can cause tissue necrosis
- Contraindications:
 - narrow angle glaucoma
 - with local anesthetic use in certain areas: toes, fingers (increased tissue sloughing)
 - labor: may delay second stage
 - cardiac dilatation
 - coronary insufficiency
- Warnings:
 - degenerative heart disease
 - overdose or iv administration: sharp rise in BP may cause cerebrovascular hemorrhage
 - fatalities may result from pulmonary edema caused by the peripheral constriction & cardiac stimulation

[Rapidly acting vasodilators such as nitrates or alpha-blockers may counteract this]

❖ none of the above should deter the use of adrenaline for the treatment of serious allergic shock or other emergency situations

- Precautions:
 - protect from light exposure
 - do not inject if solution appearance is changed:
 - pink, darker than slightly yellow or precipitated
 - readily destroyed by alkalis & oxidizing agents (O₂, Cl, Br, I, permanganates, chromates, nitrites, salts of easily reducible metals such as iron)

Salbutamol Metered Dose Inhaler

- Pharmacology:
 - beta2 sympathomimetic
 - site of action: bronchial smooth muscle (dilatation)
 - measurable decrease in airway resistance (onset) 5 to 15 minutes after inhalation
 - maximum effect: 60 to 90 minutes
 - duration of action: 3 to 6 hours
- Uses:
 - intended for management of acute asthmatic attacks
 - not intended for prophylaxis or long-term disease stabilization steroid (inhaled/oral) +/- mast cell stabilizer
 - use > 3x/week indicates disease is not adequately controlled
- Availability: 100µg/puff
- Dosing: 1-2 puffs q4-6hr
 - max 8 puffs/24hr
 - child: max 4 puffs daily
- ❖ It is recommended to test spray salbutamol inhalation aerosol into the air 4 times before using any canister for the first time and in cases where the aerosol has not been used for more than 4 weeks
- Side Effects:
 - heart: increase rate, increase force, increase BP
 - most common is nervousness and tremor; headache, tachycardia, palpitations, transient muscle cramps, insomnia, weakness, dizziness and sweating
 - paradoxical bronchoconstriction
- Warnings:
 - beta blocking drugs, esp. non cardioselective, should be avoided (i.e., propranolol)
- Drug Interactions:
 - use extreme care with MAO inhibitors & tricyclic antidepressants (potentiate cardiovascular effects)

Smelling Salts

- aromatic liquid of ammonium carbonate
- reflex respiratory stimulant for the treatment of 'hysterical' syncope
- no longer used by paramedics
- replaced by oxygen

**** Please Note - the CNPBC recommends that all registrants maintain an Emergency Medical Kit within their clinic.***

Updated September 2014