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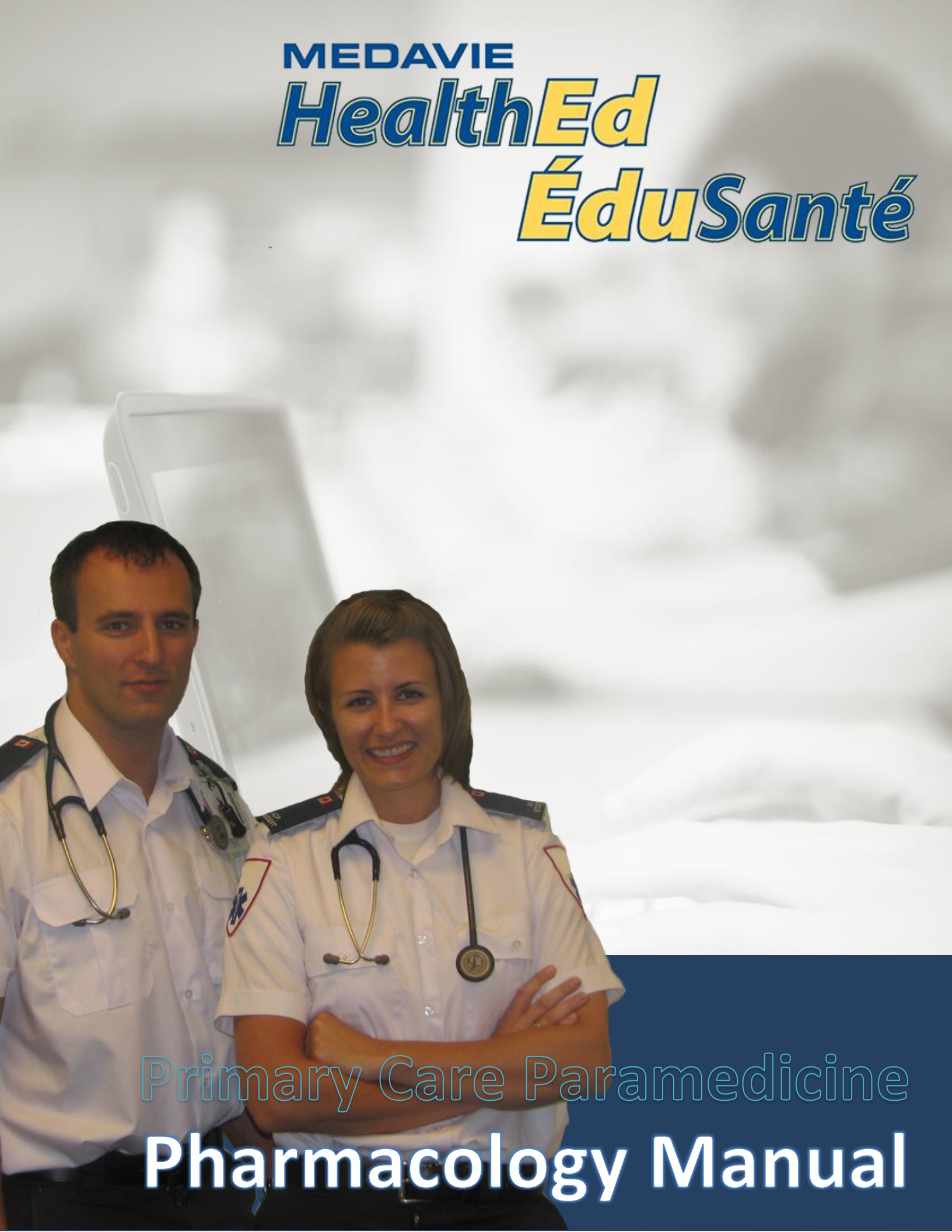

Primary Care Paramedicine

Pharmacology Manual

Property of:

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Contents

Acetaminophen (PCP)*

(Tylenol, Tempra)

Classification: Analgesic, antipyretic

Mechanism of Action:

- Inhibits prostaglandin synthesis which produces analgesic effect
- Acts on the hypothalamic heat regulating center

Indications:

- Treatment of mild pain
- Reduction of fever (due to infection)

Contraindications:

- Hypersensitivity
- Liver disease
- Major burns
- Active vomiting

Dose:

- Adult
  - 500 – 1000 mg q 4 – 6 h prn PO
- Pediatric
  - 10 - 15 mg/kg q 4 - 6 h prn PO

Side Effects:

- None if given in proper doses

Precautions:

- Acetaminophen is commonly seen in cases of overdose and may cause severe hepatic damage

Acetylsalicylic Acid (PCP) *
(ASA)

Classification: Antiplatelet, NSAID, antipyretic, analgesic

Mechanism of Action:

- Inactivates cyclooxygenase (COX) enzyme which decreases the production of prostaglandins in the tissue, blocking the pain receptors sensitivity and decreases inflammation. Due to this inactivation of COX, thromboxane A_2 production is also inhibited, which is responsible for platelet aggregation

Indications:

- Acute Coronary Syndrome
- Acute MI
- Unstable angina

Contraindications:

- GI bleed
- Asthmatics sensitive to ASA
- Hypersensitivity

Dose:

- 160 mg – 325 mg PO (Chewed)

Side Effects:

- Indigestion, gastric bleeding, Urticaria, anaphylaxis, nausea and vomiting

Precautions:

- Patients on other platelet inhibitors

$D_{50}W$ (PCP)*

Classification: Carbohydrate

Mechanism of Action:

- Increases blood glucose levels
- Hypertonic solution producing a transient movement of water from interstitial spaces into the venous system

Indications:

- Hypoglycemia (< 4.0 mmol/L who are unable to take oral glucose)

Contraindications:

- Hyperglycemia

Dose:

- Adults
  - 25 g IVP, may repeat once
- Pediatric
  - 0.5 - 1 g/kg slow IVP; dilute 1:1 with sterile water (NS can be used if no sterile water available) forming $D_{25}W$
  - May repeat once
  - Maximum total dose of 25 g

Side Effects:

- Phlebitis, tissue necrosis, rebound hyperglycemia

Precautions:

- Tissue necrosis if infiltration occurs
- May precipitate severe neurological symptoms in alcoholics (thiamine should be consider prior to administration)
- Patients with increased intracranial pressure, may worsen cerebral edema

Dimenhydrinate (PCP)*

(Gravol)

Classification: Antiemetic; Antihistamine, Anticholinergic

Mechanism of Action:

- Blocks histamine and Ach receptors in the vomiting center as well as blocks the pathway between the inner ear and the vomiting center that can cause nausea and vomiting
- Similar chemical composition to that of diphenhydramine

Indications:

- Nausea and vomiting associated with Meniere's disease
- Nausea/Vomiting
- Relief or prevention of motion sickness and Vertigo

Contraindications:

- ALOC

Dose:

- Adult:
  - 25 – 50 mg IM q 4h PRN
  - 12.5 – 50 mg IV q 4h PRN (over 30 seconds)
- Pediatric:
  - 1.0 mg/kg IV/IM max of 25 mg

Side Effects:

- CNS Depression
- Headache
- Anti-muscarinic (Blurred vision, dry mouth, urinary retention, constipation)
- Thickened bronchial secretions
- Paradoxical excitation can occur in children

Precautions:

- Pneumonia
- Asthmatic attack
- Dilute with NS prior to IV administration to avoid vein irritation

Diphenhydramine (PCP)*

(Benadryl)

Classification: Antihistamine, Anticholinergic

Mechanism of Action:

- Competes with free histamine for binding and blocks H_1 histamine receptors
- Antagonizes the effects of histamine on Histamine (HA) receptors, leading to a reduction of the negative symptoms brought on by histamine
- CNS depressant
- Has antiemetic properties (H_2 histamine receptors in the GI System)

Indications:

- Allergic and anaphylactic reactions involving respiratory difficulties, edema or severe itching

Contraindications:

- Hypersensitivity

Dose:

- Adult
  - 25 - 50 mg IV, IM
- Pediatric
  - 1 mg/kg IV, IM (max 50 mg)

Side Effects:

- Drowsiness, dizziness, headaches, excitable state, thickening of bronchial secretions, chest tightness, reflex tachycardia, hypotension

Precautions:

- The sedative effects of Benadryl can be potentiated by the administration of CNS depressants, other antihistamines, narcotics and alcohol
- Acute asthma as it may thicken secretions

Epinephrine (PCP)*

(Adrenaline)

Classification: Sympathomimetic, Adrenergic

Mechanism of Action:

- Stimulates alpha and beta receptors
  - increases heart rate
  - increases AV conduction
  - increases force of myocardial contractility
  - increases vasoconstriction (increases SVR)
- Relaxes bronchial smooth muscle (↓ A/W resistance)
- Increases coronary and cerebral blood flow

Indications:

- Anaphylaxis
- Near death asthma
- Croup/Stridor (nebulized)

Contraindications:

- Hypersensitivity
- No indications

Dose:

- Adult
  - Asthma/Anaphylaxis: 0.3 – 0.5 mg IM/SQ 1:1,000
  - Stridor: 5.0 mg (5 ml) of 1:1000 nebulized
- Pediatric
  - Asthma/Anaphylaxis: 0.01 mg/kg (1:1000) IM or SQ max 0.5 mg
  - Croup/Stridor (See Chart) – Nebulized (0.5 mg/kg 1:1,000 to a max of 5.0 mg mixed with NaCl 0.9% to make 5.0 ml of solution)

Weight (kg)	Epinephrine 1:1,1000	Normal Saline
1 kg	0.5 ml	4.5 ml
2 kg	1.0 ml	4.0 ml
3 kg	1.5 ml	3.5 ml
4 kg	2.0 ml	3.0 ml
5 kg	2.5 ml	2.5 ml
6 kg	3.0 ml	2.0 ml
7 kg	3.5 ml	1.5 ml
8 kg	4.0 ml	1.0 ml
9 kg	4.5 ml	0.5 ml
10 kg	5.0 ml	0 ml

Side Effects:

- Anxiety
- Headache
- HTN
- Cardiac dysrhythmias
- Tremors
- Chest pain
- Nausea/vomiting

Precautions:

- Cardiovascular disease
- Elderly patients
- Hypertension
- Pregnancy

Glucagon (PCP)*

Classification: Anti-hypoglycemic (Pancreatic hormone)

Mechanism of Action:

- Stimulates the release of glycogen (gluconeogenesis) from the liver, for glycogenolysis (↑ blood glucose levels)
- Smooth muscle relaxation

Indications:

- Hypoglycemia (BGL < 4.0 mmol/L and unable to take oral glucose or IV D_{50})

Contraindications:

- Hypersensitivity
- Pheochromocytoma

Dose:

- Hypoglycemia
  - Adult : 1 mg IM, SQ may repeat in 20 mins if required
  - Pediatric: 0.5 mg IM, SQ (< 20 kg)

Side Effects:

- Nausea/vomiting, rebound hyperglycemia, hypotension, tachycardia

Precautions:

- Effective only if there are sufficient stores of glycogen within the liver
- Use with caution in patients with cardiovascular or renal disease

Glucose (oral) (PCP)*

(Insta-glucose)

Classification: Sugar

Mechanism of Action:

- Provides glucose content for regular cell metabolism
- Usually absorbed through mucus membranes

Indications:

- BGL < 4.0 mmol/L in a conscious patient who can maintain their own airway
- Confusion with recorded BGL < 4.0 mmol/L (An altered level of awareness)

Contraindications:

- Unable to maintain their own airway
- Altered LOC (Level of consciousness that affects the patients ability to maintain their airway)

Dose:

- 1 tube (15 g) orally/buccal PRN

Side Effects:

- None

Precautions:

- None

Ibuprofen (PCP)*

(Advil; Motrin)

Classification: Nonsteroidal Anti-inflammatory Drug (NSAID)

Mechanism of Action:

- Decreases inflammation, pain and fever though inhibition of cyclooxygenase activity and prostaglandin synthesis

Indications:

- Treatment of mild to moderate pain
- Reduction in fever
- Anti-inflammatory

Contraindications:

- Hypersensitivity to NSAIDs/salicylates
- ASA induced asthma
- Late pregnancy (3rd trimester)
- CVA or TBI in previous 24 hours
- Major burns
- Renal failure or solitary kidney
- Age under 6 months
- GI bleeding, peptic ulcer disease
- > 65 years of age

Dose:

- Adult
  - 200 - 600 mg PO q 6 – 8 h
- Pediatric (> 6 months)
  - 7.5 mg/kg PO 6 – 8 h (For children over 12 use adult dosing)

Side Effects:

- Dizziness, drowsiness, light headedness, peripheral edema, diarrhea, nausea and vomiting

Precautions:

- Renal impairment
- History of GI bleeds
- CHF

Ipratropium Bromide (PCP)*

(Atrovent)

Classification: Anticholinergic, parasympatholytic

Mechanism of Action:

- Causes bronchodilation by competitive inhibition of cholinergic receptors on bronchial smooth muscle
- Blocks the action of acetylcholine, which inhibits parasympathetic stimulation, thus decreasing bronchial secretions
- Dries respiratory tract secretions

Indications:

- Bronchial asthma
- Bronchospasm associated with COPD

Contraindications:

- Known hypersensitivity
- Is not indicated for acute treatment of bronchospasm for which rapid response is required
- Ischemic chest pain
- Acute narrow angle glaucoma

Dose:

- Adult
    - 250-500 mcg mixed with Ventolin q 20 minutes x 3 doses
    - 2-4 puffs q 20 minutes x 3 doses
- Pediatric
    - 125 – 250 mcg mixed with Ventolin and/or NS to a minimum of 2 cc
    - 1-2 puffs

Side Effects:

- Palpitations, anxiety, dizziness, headache, nervousness, rash, nausea and vomiting

Precautions:

- Narrow angle glaucoma and patients with BPH and or bladder-neck obstruction

Ketorolac (PCP)*
(Toradol)

Classification: Nonsteroidal Anti-inflammatory Analgesic

Mechanism of Action:

- Inhibits prostaglandin synthesis producing peripherally mediated analgesia, anti-inflammatory, and antipyretic effects
- At analgesic doses little anti-inflammatory or antipyretic activity seen
- Acts peripherally verses narcotics, which act upon the CNS, therefore, no CNS depression

Indications:

- Treatment of moderate to severe pain (major burns, CA pain, renal colic, neck/back)

Contraindications:

- Patients < 16 years of age
- Patients > 65 years of age
- Patients on anticoagulants
- Hypersensitivity to ASA or NSAID
- Asthmatics due to bronchospastic activity
- Renal impairment/solitary kidney
- Current active bleeding
- Pregnancy
- Pt's at risk for bleeding as ketorolac inhibits platelet function thereby increasing bleeding time
    - Trauma
    - GI
    - CVA/TBI < 24 hrs

Dose:

- Adults
    - 10 mg IM/IV

Side Effects:

- Dizziness, headache, drowsiness, bronchospasm, heartburn, nausea, diarrhea, renal failure, edema, rash

Precautions:

- HTN, CHF, Elderly
- Hepatic insufficiency
- GI tract irritation and hemorrhage with long term use

Metoclopramide (PCP)*

(Maxeran)

Classification: Antiemetic

Mechanism of Action:

- Antagonizes central and peripheral dopamine receptors, as well as 5HT4 receptor agonistic properties, which raises the threshold of activity in the chemoreceptor trigger zone, resulting in Antiemetic effects
- Increases the amplitude and tone of gastric contractions, increases peristalsis and causes accelerated gastric emptying and intestinal transit

Indications:

- Treatment of nausea and vomiting
- Migraine headaches with or without N/V
- Biliary colic

Contraindications:

- Hypersensitivity
- GI hemorrhage, mechanical obstruction or perforation
- Pheochromocytoma (may cause HTN crisis)
- Seizure disorder
- Patients receiving medications that put them at risk for extrapyramidal reactions such as haloperidol and fluphenazine

Dose:

- Adult
  - 10 mg IV/IM/SQ; if given IV mix 10 mg in 100 ml NaCL and run over 10 minutes
- Pediatric
  - Not recommended unless written in palliative care plan

Side Effects:

- Drowsiness, fatigue, sedation, dizziness, mental depression, hypertension, hypotension, tachycardia, bradycardia, diarrhea

Precautions:

- Hx of epilepsy or Parkinson's disease (potential for exacerbation of their conditions)
- Anticholinergic drugs antagonize the effects of Maxeran on GI motility
- Sedative effects of the drug can be potentiated by other CNS depressants
- May cause extra pyramidal symptoms, treat with 50 mg diphenhydramine

Naloxone (PCP)*

(Narcan)

Classification: Narcotic Antagonist

Mechanism of Action:

- Displaces opioids from receptors, reversing the effects of narcotic overdose

Indications:

- Decreased LOC and respiratory depression in a suspected opioid overdose

Contraindications:

- Allergy or known sensitivity

Dose:

- Adult
  - 0.4 – 2.0 mg IV/IN/IM/SC q 2 – 3 min PRN
- Pediatric
  - 0.1 mg/kg IV/IN/IM/SC q 2 – 3 min PRN, max 2.0 mg per dose

Side Effects:

- Seizures, dizziness, headaches, tremulousness, tachycardia, hypotension, hypertension, nausea and vomiting

Precautions:

- Use cautiously in patients dependent on opioids, acute withdrawal may occur
- Cardiac collapse in patients postoperative with cardiac dysfunction, or patients on cardiotoxic medications
- Administer cautiously as patient may experience withdrawal symptoms or aggressive behavior

Nitroglycerin (PCP)*

(Nitro-Dur)

Classification: Anti-angina, vascular smooth muscle relaxer, vasodilator

Mechanism of Action:

- Relaxes vascular smooth muscle, there by dilating the veins and arterioles (at higher doses), causing blood pooling, which reduces the preload thus decreasing workload of the heart muscle
- Reduces left ventricular systolic wall tension, which decreases afterload

Indications:

- Possible ischemia due to ACS:
  - Unstable angina
  - AMI
- Pulmonary edema/CHF

Contraindications:

- Hypotension (< 90 mmHg)
- Severe bradycardia/tachycardia (< 50 or > 150 bpm)
- Increase ICP or intracranial hemorrhage
- Patients taking erectile dysfunction medications
  - Viagra within 24 hours
  - Cialis, Levitin, Staxyn within 36 hours

Dose:

- 0.4 mg SL q 3 - 5 min

Side Effects:

- Headaches, hypotension, bradycardia, postural syncope, weakness, dizziness, nausea/vomiting, reflex tachycardia

Precautions:

- Administration to Right Ventricular Infarction patients, due to preload dependency, can result in hypotension

Nitrous Oxide (PCP)*

(Nitronox; Entonox)

Classification: Analgesic gas

Mechanism of Action:

- Blended mixture of 50% O_2 and 50% N_2O that has potent analgesic effects
- CNS depressant with analgesic properties
- Effects last only 2 - 5 minutes after administration ceases

Indications:

- Acute pain associated with MSK injury, ACS, Renal colic, perinatal, burns and ABD pain
- Temporary relief of mild to moderate pain from painful procedures (splinting, etc)
- Acute anxiety

Contraindications:

- Patients that cannot comprehend verbal instructions or who are intoxicated
- Gas trapping conditions
    - Possible bowel obstruction
    - Air embolism
    - Pneumothorax
    - Middle ear infection
    - Decompression sickness
- COPD or signs of respiratory distress including $SaO_2 < 90\%$
- Head injury
- Altered mental status

Dose:

- Self-administered

Side Effects:

- Dizziness, light headiness, altered mental status, hallucinations, apnea, N/V

Precautions:

- Use in well-ventilated area (Inhalation by provider possible)
- Anytime > 50 % oxygen is required
- Gases may separate at -6 degrees Celsius

Ondansetron*

(Zofran)

Classification: Antiemetic, serotonin 5-HT3 receptor antagonist

Mechanism of Action:

- Affects both peripheral and central nerves
- Reduces the activity of the vagus nerve, which deactivates the vomiting center in the medulla oblongata
- Blocks serotonin receptors in the chemoreceptor trigger zone
- Has no effect on dopamine receptors and therefore does not cause extrapyramidal symptoms

Indications:

- Chemotherapy-induced nausea and vomiting
- Nausea and vomiting

Contraindications:

- Hypersensitivity
- Prolonged QTc

Dose:

- Adult
    - 4.0 mg IV/IO slow IVP over 2 minutes, may repeat once after 10 minutes
    - 4.0 mg IM, may repeat once after 10 minutes
- Pediatric
    - 0.1 mg/kg IV/IM/IO to max of 4.0 mg, only once

Side Effects:

- Headache, dizziness, constipation, diarrhea, blurred vision

Salbutamol (PCP)*

(Ventolin)

Classification: Bronchodilator, sympathomimetic B-2 agonist

Mechanism of Action:

- Selective B-2 stimulation allows for smooth muscle relaxation of the bronchioles. Also has some B-1 affects causing an increase in HR

Indications:

- Bronchoconstriction (wheeze) with SOB

Contraindications:

- Hypersensitivity
- Ischemic Chest Pain (Relative)

Dose:

- Adults
  - 5.0 mg Aerosol
  - 400 – 600 mcg (4 - 6 puffs) via MDI (1 puff q 30 sec)
- Pediatric (10 – 30 kg)
  - 2.5 mg Aerosol
  - 200 – 300 mcg (2 - 3 puffs) via MDI (1 puff q 30 sec)
- Infant (< 10 kg)
  - 1.25 mg via Aerosol

Side Effects:

- Hypertension, tachycardia, muscle cramps, dry nose and throat, headache

Precautions:

- Pt's with pulmonary edema (cardiac in origin)

Tetracaine (PCP)*

(Tetcaine)

Classification: Topical anesthetic

Mechanism of Action:

- Topical ophthalmic anesthetic to allow for flushing of an eye by removing the blink reflex

Indications:

- To facilitate eye flushing

Contraindications:

- Hypersensitivity to local anesthetics (caine family)
- Possible penetrating eye injury

Dose:

- 2 - 3 drops in affected eye
- Once treatment is done, moist gauze should be placed over eye until blink reflex returns

Side Effects:

- May briefly increase irritation

Precautions:

- May cause blurred vision