Drugs Affecting The Autonomic Nervous System

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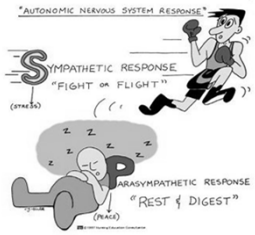


Objectives

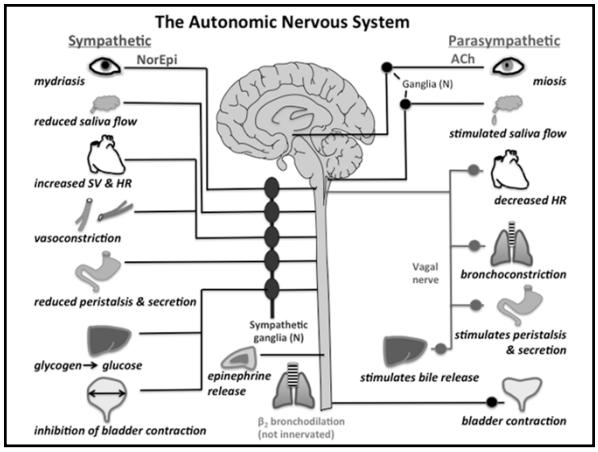
Analyze the implementation of the nursing process in the promotion & maintenance of system stability for individuals receiving autonomic nervous system (ANS) drugs

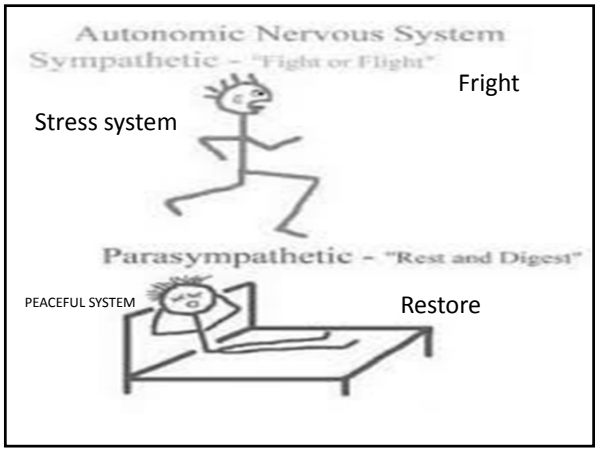
Required Reading

- Kee 8th Edition
- (Chapter 18) pp. 252-267
- (Chapter 19) pp. 268-280
- Lecture Notes

Videos for Review

- https://www.youtube.com/watch?v=QsftxduyET8
- **https://www.youtube.com/watch?v=wANxsM5Q36c ******





Two main subdivisions

- **Sympathetic**

(fight, fright or flight)

- **Adrenergic**

Neurotransmitters

Epinephrine

Norepinephrine

Dopamine

- **Parasympathetic**

(rest, restore and digest)

- **Cholinergic**

Neurotransmitter

Acetylcholine

Two Main Subdivisions

- **Sympathetic**

Four main adrenergic receptors:

A_1& A_2

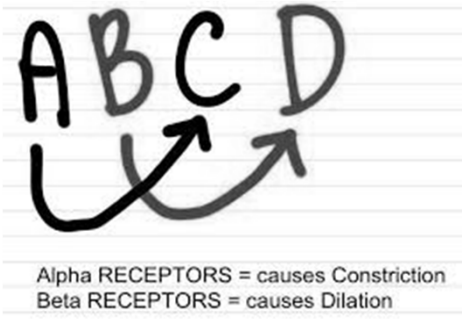
B_1& B_2

- **Parasympathetic**

Receptors:

Muscarinic

Nicotinic



Sympathetic Response

- Increase HR
- Increase RR
- Increase metabolic rate
- Increase fat & glycogen breakdown
- Bronchial relaxation
- Decrease GI activity
- Skeletal & cardiac muscle vasodilation
- Pupillary dilation

Parasympathetic Response

- Decrease HR
- Decrease RR
- Increase digestion & elimination
- Increase GI tone
- Pupillary constriction
- Bronchial constriction

Test Your Knowledge

True or False

The parasympathetic division of the ANS regulates the body's "fight or flight" systems, preparing the body for stressful situations

Drug Classifications

Sympathetic Nervous System (SNS)
- Adrenergic
- Adrenergic blocker

Parasympathetic Nervous System (PNS)
- Cholinergic
- Anticholinergics

Adrenergic Agonists

- Norepinephrine (Levophed)
- Epinephrine (Adrenalin Chloride)
- Dopamine HCL (Intropin)
- **DOBU**tamine HCL (Dobutrex)
- Phenylephrine (Neo-Synephrine)
- Albuterol (Proventil)
- Isoproteranol

Norepinephrine "Levophed"

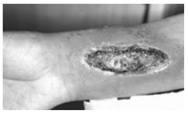
- Potent vasopressor & cardiac stimulant
- Acts directly on α & β receptors
- Little impact on β_2 receptors
- Impacts peripheral vascular resistance
- Used to restore B/P in acute hypotensive states

Norepinephrine "Levophed"

- Used in the treatment of shock states when drugs such as Dopamine & Dobutamine have failed to produce adequate BP
- **Special Note:** Lower doses are recommended in the elderly population d/t their higher likelihood of organ dysfunction & co-morbidities

Side-effects of Norepinephrine "Levophed"

- Angina
- Tachycardia
- Hypertension
- Dysrhythmias
- Extravasation



Epinephrine's Therapeutic Use

- Treatment of bronchospasm in asthma & COPD
- Shock
- Anaphylactic reactions
- Cardiac arrest
- Adjunct local anesthetics
- Open angle glaucoma

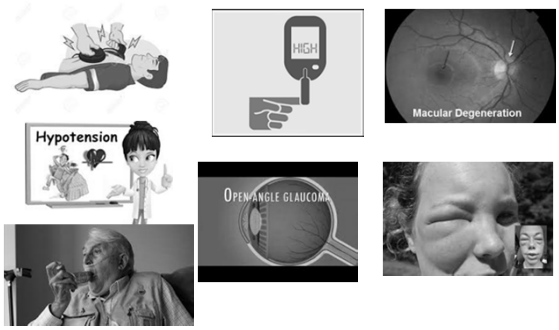
Epinephrine Contraindications

- Severe organic cardiac disease
- Diabetes
- During labor
- General anesthesia
- Hypertension
- Cerebrovascular disease

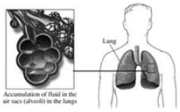
Epinephrine Side-effects

- Cardiac arrhythmias
- Angina pectoris
- Subarachnoid hemorrhage
- Nervousness
- Disorientation
- Pulmonary edema
- Insomnia

Clinical Indications Epinephrine What Picture Doesn't Fit



Side Effects **Epinephrine** What Picture Doesn't Fit



Select The Statement (s) That is Correct About Epinephrine

Multiple routes of administration

Avoid use in cardiac arrest patients

Alpha and beta agonists

Monitor aPTT

Y-tubing

Management of anaphylaxis

Dopamine (Dobtrux)

- Potent vasoactive agent
- Acts on a variety of adrenergic receptors in a dose- dependent manner
- Low & moderate dose
- Higher doses causes vasoconstriction

Dopamine (Dobtrux) Administration

- Close monitoring of pt hemodynamics & careful titration using an infusion pump based on:

✓Heart rate
✓Blood pressure
✓Peripheral perfusion
✓Urinary output
✓ECG

Dopamine (Dobtrux) Therapeutic Use

- Shock states
- Low cardiac output syndromes
- Hypotension
- Support renal perfusion

DOBUtamine

- B_1 selective agonists
- Used short-term management of patients w/ depressed cardiac contractility from organic heart disease, cardiac surgical interventions, & acute MI
- Low cardiac outputs following cardiac arrest

General Side-Effects

- HTN
- Increased heart rate
- Ectopic beats
- Vomiting
- Headache

Special Note: **Norepi, Dopamine, Dobutamine** are contraindicated in patients who are hypovolemic

Test Your Knowledge

The primary objective in pharmacological management of shock:

a. Maintain adequate renal perfusion
b. Maintain adequate hepatic perfusion
c. Maintain adequate perfusion ventricular smooth muscle
d. Maintain adequate perfusion to CNS

Test Your Knowledge

This catecholamine simultaneously can increase myocardial contractility, glomerular filtration rates, sodium excretion, urinary output, and renal blood flow:

a. Phenylephrine
b. Isoproterenol
c. Dobutamine
d. Dopamine
e. Epinephrine

QSEN In Action

- Knowledge
- Skills
- attitude

Safe Nursing Practices

- Assessment
- What are the meds being used for
- Potential for injury
- Contraindications
- Allergies
- Co-morbidities

Alpha Adrenergic Blockers

- Disrupt sympathetic response
- Relaxation of vascular smooth muscle
- Peripheral vasodilation
- Decrease B/P
- Block receptors in the smooth muscle of the bladder neck & prostate gland
- **Selective**
- **Non-selective**

Clinical Uses Alpha Adrenergic Blockers

- **Helpful in decreasing B/P**

  Example: Methyldopa (Aldomet)

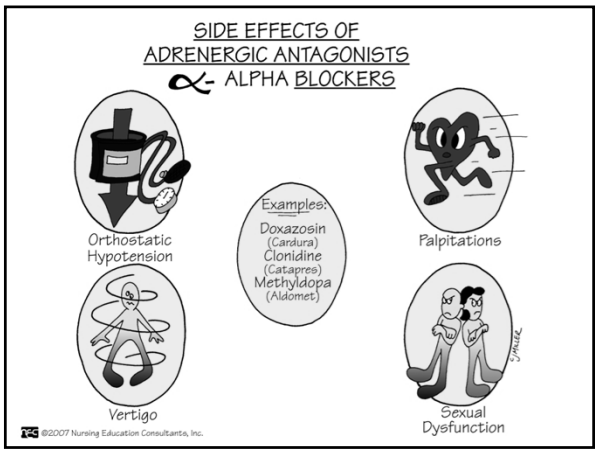
  Clonidine (Catapres)
- **Treatment of BPH**
- Peripheral vascular disease

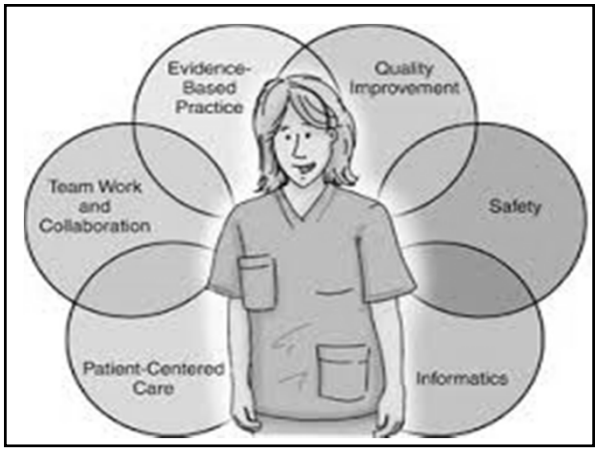
Alpha Adrenergic Blockers "osin"

- Doxazosin (Cadura)
- Prazosin (Minipress)
- Terazosin (Hytrin)
- Tamsulosin (Flomax)

Herbal alert:

Saw Palmetto-widely used to treat BPH.



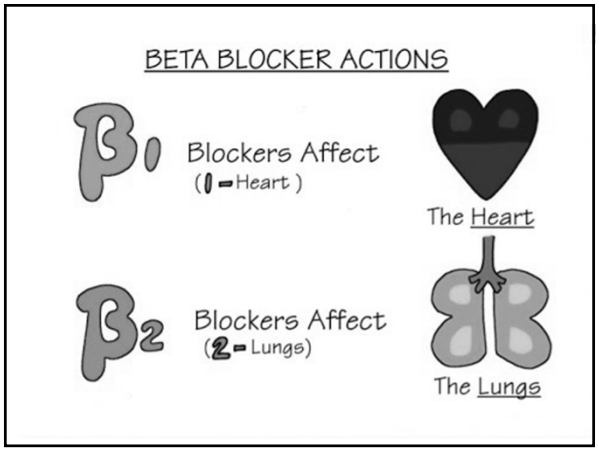


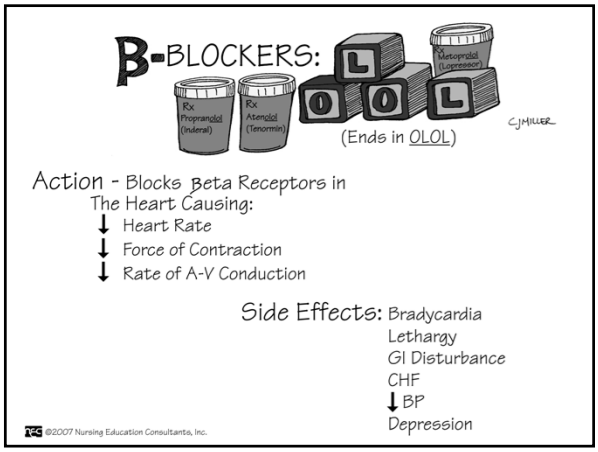
Safe Nursing Practices

- Assess for hypotension
- Assess for syncope
- I & O
- Daily weights
- Monitor labs
- Provide resources

Patient teaching

- Avoid driving
- Avoid hazardous activities
- Limit caffeine intake
- Limit clutter
- Use a night light
- Get out of bed slowly





Beta Blockers

- Block the actions of Epi and Norepi
- Slow down the nerve impulses that travel to the heart
- **Selective**
- **Non-selective**

Selective vs. Non-Selective

Selective

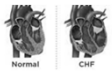
- Affect the heart

Non-Selective

- Affect lungs, liver, glucose

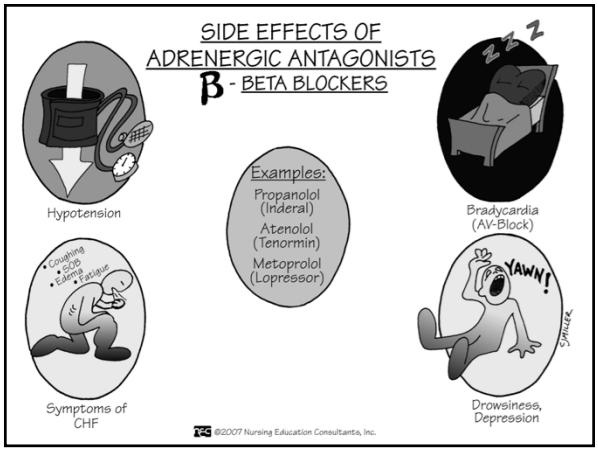
Beta Blockers Indications

- HTN
- Chest pain
- Heart attacks
- CHF
- Glaucoma
- Migraine Prophylaxis



Examples of B-Blockers "olol"

- Atenolol (Tenormin)
- Metoprolol (Lopressor)
- Propranolol (Inderal)
- Carvedilol (Coreg)



Test Your Knowledge

A beta-blocker is contraindicated in which of the following patients:

A. A 45 year old with angina
B. A 25 year old with migraines
C. A 55 year old male with a h/o two heart attacks
D. A 39 year old with asthma

Cholinergic Agonists

- Inhibit, enhance, or mimic the neurotransmitter acetylcholine
- They stimulate the PNS
- **Direct acting**
- **Indirect acting**

Direct Acting Cholinergic Drugs

- Urecholine (Bethanechol)
- Pilocarpine (Pilocar)
- Metoclopramide (Reglan)

Indirect Cholinergic Agonists

- Inhibit AChE
- AChE inhibits the breakdown of ACh
- Increases ACh

Muscarinic & Nicotinic Receptors

- Two main cholinergic receptors
- Muscarinic receptors stimulate smooth muscle & slow the heart rate
- Nicotinic receptors affect the skeletal muscles

Test Your Knowledge

- What are the therapeutic uses of cholinergic drugs?

Side Effects Cholinergic Agonist

S-alivation & sweating
L-acrimation
U-rination
D- efecation
GI- cramps
E-mesis
M-iosis & muscle spasm

Contraindications Cholinergic Drugs

- Asthma
- Hyperthryoidism
- Peptic ulcer disease
- Coronary artery disease

Anticholinergic Drugs

- Interrupt parasympathetic nerve impulses
- Relax GI & urinary tract muscles
- Decrease GI secretions
- Counteract bronchospasm
- Decrease respiratory secretions
- Decrease salivation
- Block cardiac vagal stimulation

Therapeutic Uses Anticholinergics

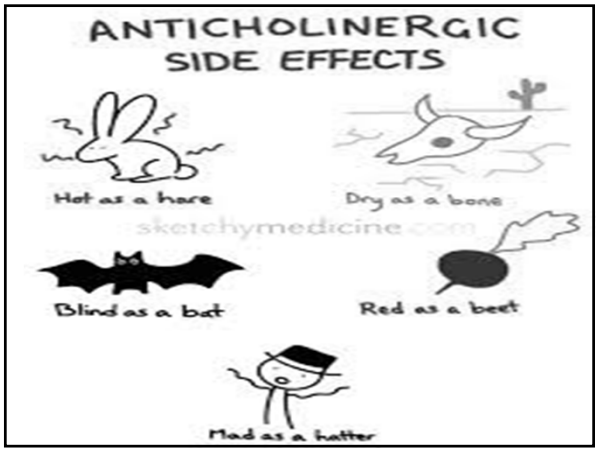
- Parkinson's disease (PD)
- Motion sickness
- Muscle relaxants
- GU disorders
- GI disorders
- Respiratory disorders
- Assist in prevention of side effects of other drugs

Examples of Anticholinergic Drugs

- Benztropine (Cogentin)
- Trihexyphenidyl (Artane)
- Oxybutynin (Ditropan)
- Tolterodine (Detrol)
- Atropine
- Scopolamine (Transderm-Scop)

Anticholinergic Side Effects

- Can't pee
- Can't see
- Can't spit
- Can't sh___t



Treatment of Anticholinergic Overdose

- Physostigmine Salicylate (Antilirium)

Test Your Knowledge

The following medications belong to which family of drugs: Carvedilol, Metoprolol, Propranolol

A. Calcium channel blockers
B. ACE inhibitors
C. Beta blockers
D. Angiotensin receptor blockers

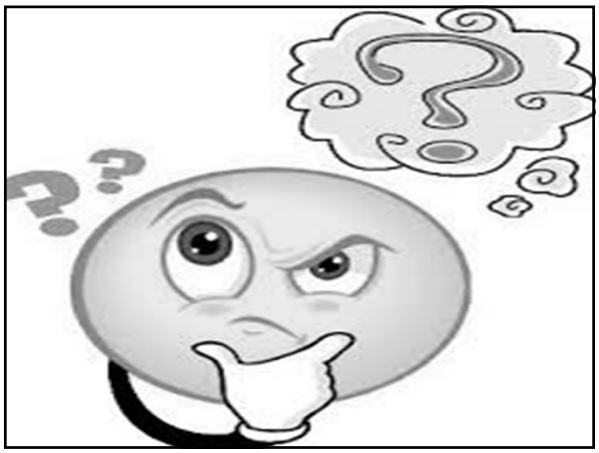
Therapeutic Uses of Anticholinergics What Picture Doesn't Fit

Test Your Knowledge

Cholinergic drugs have which of the following therapeutic effects?

A. Vasoconstriction
B. Mydriasis
C. Urinary retention
D. Increased GI motility

Test Your Knowledge

Cholinergic drugs are indicated for which of the following situations?

A. Treating a postoperative client who has bradycardia
B. Preventing salivation and sweating
C. Lowering intraocular pressure in clients with glaucoma
D. Inhibiting muscular activity in the bladder