

Bullet Point Nursing

Adrenergic pharmacology

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Nervous system A & P review

- Adrenergic receptors activate the sympathetic nervous system
 - Primary sympathetic neurotransmitter is norepinephrine
- Cholinergic receptors activate the parasympathetic nervous system
 - Primary parasympathetic neurotransmitter is acetylcholine
- Adrenergic receptor activation review:
 - A1 – Vasoconstriction
 - Prostate contraction
 - A2 – Sympathetic inhibition
 - B1 – Inotropic and chronotropic cardiac effects
 - B2 – Bronchodilation
 - B3 – Detrusor muscle relaxation
- Adrenergic effects:
 - Dilated pupils (mydriasis)
 - Bronchodilation
 - Tachycardia
 - Hypertension
 - Decreased GI activity

Drug class: Alpha one adrenergic antagonists (Alpha blockers)

- Drugs:
 - Uroselective (BPH):
 - Tamsulosin (Flomax)
 - Cardioselective (HTN):
 - Prazosin (Minipress)
 - Dual indicated (Both):
 - Doxazosin (Cardura)
- MOA: Inhibits alpha one receptor blocking vasoconstriction also relaxes the prostate
- Indications: BPH and HTN
- SE/AE: Orthostatic hypotension and reflex tachycardia, sexual dysfunction
- Phentolamine is a drug in this class that is used for extravasation and diagnosing a pheochromocytoma

Drug class: Beta adrenergic antagonists (Beta blockers)

- Drugs:
 - Nonselective:
 - Propranolol

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- Cardiosselective:
 - Metoprolol
 - Atenolol
 - Esmolol
- Non-selective with vasodilating effects:
 - Labetalol
 - Carvedilol
- MOA: Blocks beta one receptors, reducing cardiac chronotropy and inotropy
- Indications: Angina, HTN, heart failure, AMI, dysrhythmias, migraines prevention, anxiety
- SE/AE: Fatigue, bradycardia, hypoglycemia, sexual dysfunction
- Black Box warning: Abrupt discontinuation can cause adverse cardiac effects
- Caution in using a nonselective with underlying pulmonary conditions,
 - Can cause bronchoconstriction
- Often used option for HTN in pregnancy
- Carvedilol is used primary for heart failure
- Assess HR and BP prior to admin

Drug class: Alpha one adrenergic agonist

- Drug:
 - Phenylephrine (Neosynephrine)
- MOA: Stimulates alpha one adrenergic receptors resulting in vasoconstriction
- Indications: Shock, hypotension
 - Also available OTC for nasal congestion
- Discussed further below

Drug class: Alpha two adrenergic agonist

- Drug:
 - Clonidine (Catapres)
 - Methyldopa
- MOA: Increases alpha two adrenergic effects and reducing sympathetic effects
- Indications: Hypertension
 - Especially hypertension in pregnancy (preeclampsia)
- Off-label uses: Pain, mental health

Drug class: Beta one adrenergic agonist

- Drugs:
 - Dobutamine
 - Isoproterenol
- MOA: Beta one adrenergic agonist that increases cardiac chronotropy and inotropy effects
- Indications: Acute decompensated heart failure
- IV only
- Considered a vasopressor but not a vasoconstrictor. Has minimal impact on increasing BP
- Discussed further below

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Drug class: Beta two adrenergic agonist

- Drugs:
 - Albuterol
 - Levalbuterol
- MOA: Beta two adrenergic agonist resulting in bronchodilation
- Indications: Asthma, COPD
- SE/AE: Tachycardia, hypokalemia, hyperglycemia, palpitations
- Dosed PRN (use as needed), not for scheduled usage except with EIB
- Levalbuterol may have less cardiac side effects
- Discussed further in pulmonology lecture

Drug class: Beta three adrenergic agonist

- Drug:
 - Mirabegron (Myrbetriq)
- MOA: Beta three adrenergic agonist resulting in detrusor smooth muscle relaxation thereby increasing bladder capacity
- Indications: Overactive bladder
- SE/AE: Angioedema, cardiac effects (HTN, tachycardia), urinary retention

Drug class: Vasopressors / Vasoconstrictors

- Drugs:
 - Epinephrine (Adrenalin)
 - Alpha and beta-adrenergic activation
 - Norepinephrine (Levophed)
 - Alpha and beta-adrenergic activation
 - Phenylephrine (Neo-synephrine) *Does not increase contractility (no “pressor” support)*
 - Alpha adrenergic activation
 - Dopamine
 - Low dose: Dopaminergic activation (increased perfusion to the kidneys)
 - Medium dose: dopaminergic and beta-adrenergic activation
 - High dose: alpha adrenergic activation
 - Isoproterenol *Does not cause vasoconstriction*
 - Beta adrenergic activation
 - Dobutamine *Does not cause vasoconstriction*
 - Beta adrenergic activation
- MOA: activates adrenergic and dopaminergic receptors as noted above
- Indication: Shock
- SE/AE: tachycardia and palpitations
- Black Box warning: Can cause extravasation
 - Is treated with phentolamine
 - Should be given via central line to reduce this risk
- Standard practice is to always infuse through a pump
 - Should ideally be given via a central line to reduce the risks of infiltration

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- Doses are titrated to target BP (or MAP)
- Do not stop abruptly, must be tapered down
- Epinephrine and norepinephrine are most commonly dosed in mcg/min starting at 2-5mcg/min
- Dopamine is most commonly dosed in mcg/kg/min starting at 2-5 mcg/kg/min
- Dopamine can cause tachydysrhythmias
- Epinephrine 1:10,000 is the concentration for infusion
 - Epinephrine 1:1,000 is the concentration for anaphylaxis (i.e. epi pen)
 - Stable allergies may be treated with diphenhydramine, albuterol, steroids, o2
- Does not correct underlying issue in shock related to volume loss

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References

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