Bullet Point Nursing

Pharmacology – Endocrine

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Endocrine pathophysiology review

- Growth hormone (GH): Stimulates growth and cell reproduction
    - Too little can cause short stature, too much can cause acromegaly
- Antidiuretic hormone (ADH): Increases water reabsorption in the renal collecting ducts
    - Too little can cause diabetes insipidus, too much can cause SIADH
- Adrenal corticotropic hormone (ACTH): Regulates metabolism and stress responses, reduces inflammation
    - Too little can cause Addison disease, too much can cause Cushing syndrome
- Thyroxine: Regulates metabolism, energy production, and growth
    - Too little causes hypothyroidism, too much causes hyperthyroidism
- Serum calcium:
    - Parathyroid Hormone (PTH): Increases serum calcium by stimulating bone resorption, enhancing renal calcium reabsorption, and activating vitamin D to promote intestinal calcium absorption
    - Calcitonin: Decreases serum calcium by inhibiting osteoclast activity, reducing bone resorption, and promoting renal excretion of calcium

Drug class: Growth Hormone

- Drug:
    - Somatotropin
- MOA: Stimulates growth of all tissue
- Indications: Short stature, growth failure
- SE/AE: Hyperglycemia
- Parenterally only

Drug class: Somatostatin analog

- Drug:
    - Octreotide
- MOA: Inhibits the release of growth hormone
- Indications: Acromegaly, diarrhea
- SE/AE: GI issues
- Parenterally only
- Pasireotide is another drug in this class used for acromegaly and Cushing disease

Drug class: Antidiuretic hormone

- Drug:
    - Vasopressin

- MOA: Reabsorbs water from filtrate, vasoconstriction
- Indication: Shock and cardiac arrest
- SE/AE: Hypertension, arrhythmias, water retention
- Parenterally only
- Another medication in this class is desmopressin (DDAVP)
    - This is used for diabetes insipidus, nocturnal enuresis, von Willebrand disease, and hemophilia A
    - Does not cause vasoconstriction like vasopressin
    - SE/AE: Hyponatremia, fluid overload, and headache
    - Available PO and parenterally

Drug class: Glucocorticoid / Corticosteroid

- Drugs:
    - Hydrocortisone
    - Prednisone
    - Methylprednisolone
    - Dexamethasone
    - Betamethasone
- MOA: Suppresses inflammation, immune response, and adrenal function
- Indications: Adrenocortical insufficiency, Addisons, inflammation, immune suppression, nausea
    - Specific conditions include gout, asthma, covid-19, IBD, allergies, cancers, gout
- SE/AE: Immunosuppression, hyperglycemia, hypertension, osteoporosis, mood swings, weight gain, sodium and fluid retention, PUD, abnormal fat deposits (Cushing's)
- Preferential to select steroids with a local effect versus a systemic effect (intranasal versus PO)
    - Available topically, intranasal, inhaled, orally, and via injection
- Steroids must always be tapered when discontinued
- Increased risk of adverse effects if given with NSAIDS
- Avoided in patients with an active infection

Cosyntropin is used for diagnosing adrenocortical insufficiency due to adrenal vs pituitary causes

Drug name: Ketoconazole

- MOA: Antifungal, reduces cortisol and androgen production
- Indication: Fungal infections
- Off-label indication: Cushing syndrome
- SE/AE: Hepatotoxicity, GI issues
- Black box warning: Hepatotoxicity, multiple interactions can lead to QT prolongation

Drug name: Levothyroxine (Synthroid)

- MOA: Synthetic form of thyroxine
- Indication: Hypothyroidism
- Titrated up and tapered down based on labs (TSH)
    - Dosed in small increments from 12.5mcg to 300mcg

    - Additional labs monitored include T3 and T4
- Onset is 3-5 days, peak effects take 4-6 weeks
- Therapy is generally lifelong
- Should be taken in the morning to prevent insomnia
- Black Box warning: Not to be used for weight loss
- Monitor for over or under treatment (s/s of hypo and hyperthyroidism)

Drug class: Thioamide

- Drugs:
    - Methimazole
    - Propylthiouracil
- MOA: Blocking synthesis of thyroid hormones
- Indication: Hyperthyroidism
- Black Box warning: PTU has increased risk of hepatotoxicity
- Methimazole cannot be taken in the first trimester of pregnancy

Potassium Iodide (Lugol's solutions) or sodium iodide is used to suppress the thyroid prior to surgery and to treat thyroid storm

Radioactive Iodide (I-131) is used to treat hyperthyroidism and thyroid cancer

Drug name: Calcitriol (Vitamin D analogue)

- MOA: Increases calcium reabsorption by the kidneys, absorption by the intestines, and secretion of calcium from the bones to the bloodstream
- Indications: Parathyroid disorders, hypocalcemia
- SE/AE: Related to excess calcium

Drug name: Calcitonin

- MOA: Similar to human calcitonin
- Indications: Hypercalcemia, Paget disease, osteoporosis
- SE/AE: Hypocalcemia
    - This is salmon derived product. Caution in those with allergies

Diabetes pathophysiology and nursing review

- Type 1 diabetes is an autoimmune disorder where the body's immune system attacks and destroys the insulin-producing beta cells in the pancreas
- Type 2 diabetes is primarily a result of insulin resistance, where the body's cells do not respond effectively to insulin
- Hypoglycemia is treated with oral glucose, IV dextrose, or IM glucagon
- The body releases insulin in response to a high serum glucose level and glucagon when low
- Treatment of DM is monitored via blood glucose and A1C levels
- DKA and HHS are treated with insulin and fluids
- Complications include diabetic retinopathy, nephropathy, neuropath, atherosclerosis, PVD
- Educate patients on lifestyle modifications

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Drug class: Insulin

Rapid	Lispro, Aspart	15-30 min	3-5 hrs	Used for meal coverage
Short	Regular (Humalin R)	0.5-1 hr	5-10 hrs	IV infusion
Intermediate	NPH (Humalin N)	1-2 hr	12-24 hrs	AKA Isophene
Long	Glargine, Detemir	1-4 hr	24 hrs	Basal coverage

- MOA: Insulin stimulates cellular uptake of glucose and promotes conversion of glucose into glycogen
- Indications: Diabetes
    - Also used with glucose to treat acute hyperkalemia
- Only given parenterally
- SE/AE: Hypoglycemia, hypokalemia
- Multiple insulins may be used to provide for basal coverage in addition to prandial coverage
- When drawing NPH with a short acting, draw up the short acting insulin first
- Insulin is stored at refrigerated temperature
    - Once in use it can be used for thirty days and can be stored at room temperature
- Goal is a hemoglobin A1C of less than 7%
- If the insulin causes hypoglycemia treat with oral glucose or IV glucose / IM glucagon
- Educate patient and family to rotate injection sites to prevent lipodystrophy
- Advise patient to wear a medical alert bracelet
- Teach signs and symptoms of hypoglycemia and hyperglycemia
- Sliding scale is sometimes used to calculate dose for insulin
    - This prescribes a specific dose based upon the blood glucose level
- Assess blood glucose level before and after insulin administration
    - Normal is 70-110
- IV insulin infusion is considered high risk and is usually only given in the ED/ICU

Drug class: Biguanides

- Drug:
    - Metformin (Glucophage)
- MOA: Blocks glucose production in the liver and increases insulin sensitivity
- Indications: Diabetes
- Off-label use includes PCOS
- Black Box warning: Can cause lactic acidosis
- SE/AE: GI upset, worse upon starting treatment
- Alcohol should be avoided
- First line agent for type two diabetes

Drug class: Glucagon-like peptide-1 receptor agonists (GLP-1 agonists)

- Drugs:
    - Exentide (Byetta)
    - Liraglutide (Victoza)
    - Dulaglutide (Trulicity)
    - Semaglutide (Ozempic)

- MOA: Increases the effects of incretin which stimulates release of insulin and blocks release of glucagon
- Indications: Diabetes
    - May also be used for weight loss
- Black Box warning: Thyroid C-cell cancer risk
- SE/AE: GI effects, increased HR
- Subcutaneous only
- Often used as a second line agent following metformin

Drug class: Sulfonylureas

- Drug:
    - Glipizide (Glucotrol)
    - Glimepiride
- MOA: Stimulates the release of insulin
- Indications: Diabetes
- SE/AE: Hypoglycemia, weight gain
- Caution for a disulfiram like reaction when combined with alcohol

Drug class: Meglitinides

- Drug:
    - Repaglinide
- MOA: Stimulate the release of insulin
- Indications: Diabetes
- SE/AE: Hypoglycemia
    - Should be followed by a meal to avoid this

Drug class: Thiazolidinediones

- Drugs:
    - Rosiglitazone (Avandia)
    - Pioglitazone (Actos)
- MOA: Increases insulin sensitivity
- Indications: Diabetes
- SE/AE: Weight gain
- Black Box warning: Can cause or exacerbate heart failure
- Contraindicated in pregnancy, heart failure, high risk for fractures, and acute liver failure

Drug class: Dipeptidyl peptidase-4 inhibitors (DPP-4 inhibitors)

- Drugs:
    - Linagliptin (Tradjenta)
    - Sitagliptin (Januvia)
- MOA: Block the breakdown of incretin, which stimulates release of insulin and blocks release of glucagon
- Indications: Diabetes

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Drug class: Sodium-glucose co-transporter 2 inhibitors (SGLT-2 inhibitors)

- Drugs:
    - Dapagliflozin (Farxiga)
    - Empagliflozin (Jardiance)
- MOA: Promote urinary glucose excretion; it also reduces cardiac preload and afterload
- Indications: Diabetes, chronic kidney disease, and heart failure
- SE/AE: UTI in females and weight loss

Drug class: Alpha glucosidase inhibitors

- Drug:
    - Acarbose
- MOA: Slows the digestion of carbohydrates
- Indications: Diabetes
- SE/AE: GI effects
- Take at the start of the meal

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References

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