Exam 2

(50Q, rhythm strips, more cardiac, know ekg measurements/what each thing means, 10 thyroid, 5 DI and SIADH, 5 Adrenal, 1-3 math)

Endocrine

Most abundant

*T4 needs iodine to turn into T3 to be able to used by the body

1. Thyroid (T13&T4) – synthesized from iodine ****know primary & secondary
   a. Hyperthyroidism- GRAVES DISEASE (insufficient iodine, infections, genetics)
      i. THYROIDISME – tremor, heart rate up, yawning, restless, oligomenorrhea, intolerance to heat, diarrhea, irritability, sweating, muscle wasting/weight loss, exophthalmos + goiter w/bruit
      Signs & symptoms
      Nursing care: artificial tears, salt restriction, elevate HOB, dark glasses, if unable to close eye @ night -> use tape to help shut (gently)
      ii. Thyrotoxiscosis: excessive amounts of hormone, life threatening
      HOB elevated
      1. S&S: tachycardia, HF, shock, hyperthermia/fever, restlessness, seizures, abd pain, diarrhea, delirium, coma
      First line antithyroid drug
      Methimazole (Tapazole)
      Pregnant or adverse reaction to
      Propylthiouracil (PTU)
      2. Tx: reduce hormones, manage resp distress, reduce fever, replace fluids, eliminate stressor
      ↑Protein 1-2 g/kg ↑carbs & cardiac problems
      Monitor: Patent airway after thyroidectomy
      Aqueous iodine (Lugol's solution)
      iii. Diagnostics: TSH, total T3 & T4
      iv. Treatment: high-calories diet 4,000-5,000, avoid seasoned & high fiber foods/caffeine, give PTU (blocks synthesis), iodine (short term), propranolol (tachycardia), RAI (radioactive iodine) (destroys thyroid tissue), partial thyroidectomy
      Respirations may be difficult d/t: excess swelling, hemorrhage, hematoma formation
      1. Preop: meds to achieve normal levels, admin iodine, pt teaching
      2. Postop: maintain airway – monitor for laryngeal stridor, IV Calcium (PTH released)
         a. Hypocalcemia: Trousseau's (bp cuff/arm flexion) and Chvostek's (facial nerve) signs

      Nursing care:
      - Skin care -> use soap gently, moisturize frequently, turn/ low-pressure mattress
      - VS, weight, I/O, edema
      - CV response to hormone
      - energy/level, mental alertness

   b. Hypothyroidism (iodine, atrophy, from hyper treatment, drugs, cretinism in infancy)
      i. S&S: fatigue, mental changes, bradycardia, constipation, cold intolerance, weight gain, myxedema, hair loss
      ii. Myxedema Coma:
      iii. Diagnostics: primary (TSH inc to attempt to stimulate thyroid), secondary (TSH cannot be released)
      iv. Treatment: synthroid (in the AM w/out food) – forever! Do not switch brands
      v. Primary: thyroid issues, TSH high, T4 low
      vi. Secondary: pit issues, TSH low, T4 low
2. Anti-Diuretic Hormone ****know Na/urine SG
   a. Diabetes Insipidus (low ADH) – not holding on to water
      i. Causes: Central (pituitary issue), Nephrogenic (kidney), Dispogenic (excessive fluid intake)
      ii. S&S: polydipsia, polyuria, dehydrated, fluid/electrolyte imbalances, dilute urine, concentrated blood, weak pulses, hypernatremia, htn, inc Hct, dry skin
      iii. Diagnostics: serum levels and water deprivation test, give desmo/vasopressin (specific gravity increases if central)
      iv. Treatment: treat cause, replace fluids, replace ADH w/vasopressin, low Na diet
   b. Syndrome of Inappropriate ADH (high ADH) – holds on to too much water
      i. Causes: small cell lung cancer, head trauma, drugs

check k+
-dont give with milk or antacids

Demeclocycline

"Inhibits ADH, on renal tubules, increases in dilute urine

ii. S&S: dilutional hyponatremia, fluid retention, dilute blood, weight gain, concentrated urine, tachycardia, HTN, dec Hct, confusion/seizures

iii. Treatment: treat cause, restrict fluids (daily weights), give hypertonic fluids – pulls water out, diuretics

Furosemide (Lasix) – for severe hyponatremia

check k+

Nursing care: low urine output, fluid restriction, ↑HOB, hard candy, seizure, fall, aspiration precautions, delayed wound healing

3. Adrenal Cortex (Corticosteroids)

a. Cushing Syndrome – high levels

Main cause: iatrogenic exogenous corticosteroids

i. Causes: excessive prednisone use, pitu tumors, adrenal tumors

ii. S&S: moon face, buffalo hump, thin hair, weight gain/truncal obesity, thin extremities, thin/fragile skin, Na/Water retention, hypokalemia, Hyperglycemia, gynecomastic, period issues (Menstrual issues), purple striae

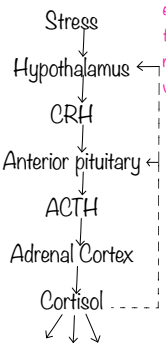
iii. Diagnostics: 24-hr urine, plasma cortisol, dexamethasone suppression test, plasma cortisol, CT, MRI

iv. Treatment: Pituitary Adenoma (remove tumor), Adrenal Tumor/hyperplasia (remove tumor or gland), Ectopic ACTH-tumors (treat primary tumor)

1. From use of steroids: gradually dec dose/tapering

Post OP Adrenalectomy:
- Critical period of instability of corticosteroid imbalance 24-48 hrs

IV access!



Adrenal androgens excess: acne, females develop male attributes & visa versa

Nursing care:
- Fluid imbalance d/t
- Risk for infection d/t delayed wound healing

b. Addisons, Adrenocortical Insufficiency – low levels (adrenal cortex destroyed by antibodies)

Secondary:
- lack of ACTH
- secondary to pituitary disease or hormone therapy

i. Causes: autoimmune, TB, adrenal infection, cancer of adrenals, bleeding adrenals

ii. S&S: adrenal crisis, hyperkalemia, hyponatremia, hypoglycemia, fluid volume deficit, shock, low weight, inc pigmentation, tachycardia, dehydration, fever, weakness, confusion, loss of libido, hypotension

iii. Treatment: Saline or D5NS, glucose, corticosteroids → if cushings develops: gradually discontinue therapy, decrease dose, convert to alternate day regimen

Solu-Cortef (Methylprednisolone)
- corticosteroid

Cushions - during procedure
Addisons - ↑ cortisol

1. Hydrocortisone: low doses okay, large can be toxic (adrenal suppression and cushings)
2. Fludrocortisone: salt/water retention (↑ Increase)
3. HRT

Cardiac Dysrhythmias

1. **Cardiac Output:** SV x HR (normal is 4-6L/min)
   a. Both tachy and brady can lead to dec CO
   b. DEC CO = priority nursing dx
   c. S&S: hypoxia, dizziness, low BP, cool skin, thread pulse, SOB, dec UO

Nursing dx:
- ineffective tissue perfusion r/t interrupted arterial flow
- decrease CO r/t altered electrical conduction
- activity intolerance r/t decrease CO
- anxiety/fear r/t threat of death, change in health status
- ineffective health maintenance r/t deficient knowledge regarding self care w/ disease

2. **Conduction:**
   a. Depol: more + on inside (contraction) — discharge state
   b. Repol: more – on inside (relaxation) — recharge state
   c. SA to AV to His Bundler to RLBB to PF = contraction
      i. SA node (normal pacemaker) and atria —> 60-100 times/min
      ii. AV node and bundle of His —> 40-60 times/min
      iii. Bundle branches & Purkinje fibers —> 20-40 times/min
   d. Ectopic start: fails to start at SA node first
   e. 60-100 BPM
   f. How it works:
      i. SA fires when depolarized = atrial contraction
      ii. AV receives from SA, short delay, impulse to bundle of his

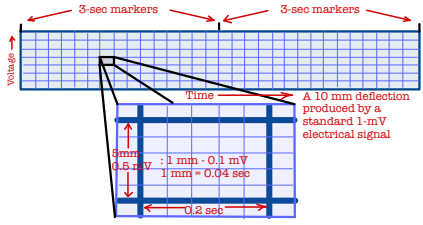
Preload: volume of blood in the ventricle chamber at the end of diastole
Afterload: resistance that the left ventricle must overcome to empty to circulate blood

Depolarization does not mean contraction > An electrical event expected to result in contraction

iii. Perkinje Fibers = ventricular contraction

Refractory period – (PVC), premature ventricular contraction (R on T) can put pt in ventricular fibrillation

3. EKG



Normal

P wave – smooth and rounded

QRS Complex –

Q -first negative deflection

R -first positive deflection

S -negative deflection following **R** wave

QT Interval – measured from beginning of **Q** wave to the end of the **T** wave. Represents the amount of time it takes the ventricles to depolarize and repolarize

ST Segment – between **QRS** & **T** wave -> isoelectric line (flat) in limb leads

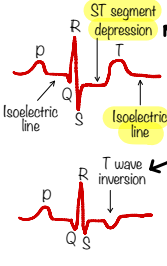
a. The parts

i. P Wave: depol of atria/contraction (peaked, notched, or inverted indicates COPD, CHF, valve disease)

ii. PR Interval (beginning of P wave to start of QRS): impulse conduction from SA to AV (0.12-0.20 sec) (3-5 little squares) (5 little squares = 0.2 sec)

1. Represents the time taken for the impulse to spread through the atria -> AV node -> and bundle of His -> the bundle branches & Purkinje fibers to a point immediately preceding ventricular contraction
2. Allows time for atria to empty contents into ventricles

iii. QRS: depol of ventricles/contraction, measured from beginning of Q to end of S (0.04-0.11 sec)



iv. T Wave: repol of ventricles (relaxation), inverted = infarction or ischemia (<3 not getting enough O2/blood d/t possible plaque on coronary artery)

1. Peaked T wave = hyperkalemia

v. ST segment depression d/t MI (patient may display 1 or both)

vi. U Wave: may see normally, often = hypokalemia, positive deflection after T wave

b. How to Measure

i. 1 small square = .04 sec

ii. 1 large square = .20 sec

iii. Lines at top are 3 seconds apart

iv. Calculating Heart Rate: count the R-R intervals in a 6 sec strip and multiply by 10

c. 12-lead: CP, SOB, MI, Telemetry

d. DEC CO:

i. Evaluation: VS, ekg, labs (basic, Mg, Phos, CBC, Trops), CXR, Echo

ii. S&S: hypotension, pallor, cool skin, dizziness, chest pain, weakness, confusion, dyspnea, hypoxia

Sinus = signal is starting at SA Node

4. Sinus Dysrhythmias

a. Sinus Rhythm(NSR): 60-100 bpm, regular, P wave for every QRS, PR = .12-.20 and QRS 0.04-0.10

- Can be asymptomatic
- We treat brady & tachy symptoms (look at causes)

b. Sinus Bradycardia: <60 bpm (decreased CO), regular, P wave for every QRS
   i. Etiology: Athletes, vagal stim, MI, beta blockers, hypothermia, inc ICP
   ii. Management: assess for symptoms (atropine, pacemaker, inc fiber/water)

c. Sinus Tachycardia: >100-150, regular, P wave for every QRS
   i. Etiology: hypoxia, exercise, fever, hypotension, hypovolemia, anemia, MI, HF, anxiety, drugs (epi, atropine, amphetamines)
   ii. Management: assess for symptoms, IV fluids, correct cause (i.e pain), beta blockers, Valsavla,

5. Atrial Dysrhythmias

Calcium channel blockers

Irregular

Atrial fibrillation/ dysrhythmias will cause differences in the P wave
Ventricular fibrillation will cause differences in the QRS interval

a. PAC (premature Atrial Contraction): <100 bpm, early P waves (conducted (w/ QRS) or non conducted (no QRS)), P wave for every QRS (bigeminy) — every other, or trigemini (3) every third
   i. Etiology: stress, fatigue, caffeine, alcohol, tobacco, CHF, electrolyte issues, COPD, hypoxia, heart disease, MI, dig toxicity
   ii. Management: assess for symptoms, withdraw stimulus, beta blockers-Metoprolol, lifestyle changes – looks like normal QRS on strip like an irregular sinus rhythm

b. Atrial Flutter: >200-350 bpm atrial, about 150 bpm ventricular, unidentifiable P waves, F waves (Saw tooth), QRS normal (loss of atrial "kick")

Stroke – FAST
F – face (look uneven?)
A – arm (1 hanging)
S – speech (slurred?)
T – time (CALL 911!)

   i. Etiology: CAD, COPD, HTN, mitral valve issues, pulm. Embolism, ischemic heart disease, acute MI, hypoxia, dig toxicity, cor pulmonale, cardiomyopathy
   ii. Management: rate control w/ beta blockers & Ca channel blockers, antiarrhythmics, anticoags, cardioversion, ablation, Amiodarone — Warfarin

c. Atrial Fibrillation: 350-600 bpm, irregularly irregular, no P waves (d/t loss of effective atrial contraction), F waves, QRS normal (rapid ventricular response = >100)
   i. Etiology: CAD, rheumatic heart disease, HTN, cardiomyopathy, HF< pericarditis, hypoxia, acute MI, valve disease, thyrotoxicosis
   ii. S&S: asymptomatic if controlled, palpitations, fatigue, dec exercise tolerance, syncope, irregular pulse
   iii. Management: control rate w/beta blockers, antiarrhythmic, anticoags, cardioversion, Ca channel blocker

above AV node

Also known as PSVT
Paroxysmal

d. Supraventricular Tachycardia (SVT): 150 to 220 bpm, regular, P waves hidden in T waves, Normal QRS – looks normal w/out P waves, abrupt onset & ending, sustained (SVT) w/ regular rhythm
   i. Etiology: overexertion, stress, CAD, hypoxia, fever, cor pulmonale, dig toxiticity, rheumatic heart disease, caffeine, tobacco

Vagal stimulation (coughing)

   ii. Management: Valsalva, convert rhythm (adenosine, beta blockers, antiarrhythmic (amiodarone), cardioversion, ablation (look at where focus is)

Sotalol

6. Ventricular Dysrhythmias

wide & distorted QRS complex: > 0.12

a. Premature Ventricular Contraction (PVC): One (isolated), Two (couplet), Three (V Tach), Every Other (bigeminy), Every Third (trigeminy), no P Wave, QRS >0.12, ST/T opposite directions of QRS

ectopic focus in the ventricles

   i. Etiology: stimulants, electrolyte imbalances, fever, infection, stress, exercise, gastric overload, acute MI, acidosis, cyclic antidepressants, heart disease

H & Ts
hypoxia hypovolemia
hydrogen

ii. Management: monitor EKG closely, ID cause, drugs (beta blockers, amiodarone, lidocaine), PVC causes pause in pulse (use apical rate).

b. Ventricular Tachycardia: >100-250 bpm, regular, no P waves, QRS >0.12, sustained(30+ sec)/unsustained, 3+ PVCs – SHOCK!
or Irregular
T wave goes opposite direction of QRS

i. Etiology: electrolyte imbalances, MI, cardiomyopathy, CAD, CNS disorders, drug toxicity, prolonged QT, frequent PVCs, infection

ii. Management: ID rhythm, assess pt for pulse, monitor, apply pacing pads

1. If hemo stable: treat cause
   a. Meds: epi, vasopressin, amiodarone, lidocaine, beta blockers
   b. ICD implantation
2. If unstable/no pulse: CODE blue, CPR/rapid defibrillation w/vasopressors & antidysrhthmics

Torsades
- if pt has no pulse
↳ CPR & rapid defib
↳ code blue
-awake w/ pulse
↳ may IVPB
- evaluate polypharm etiology
- atropine

c. Ventricular Fibrillation (VF): no pulse, no rate/rhythm, quivering ventricle = no CO = Death. – SHOCK immediately

i. Etiology: Acute MI, HF, hypoxia, hyperkalemia, drug toxicity, electrical shock, hypothermia, untreated VT, post cardiac cath

ii. Management: CPR and rapid defibrillation – pt will die without

- unresponsive
- pulseless
- apnea
DO NOT DEFIB!

d. Asystole: total absence of ventricular activity, possible occasional P waves, cardiac arrest

i. Management: CPR, epi/atropine, transcutaneous pacing (not-shockable)

7. Atrioventricular Blocks
Can give every 3-5 min
increases HR

a. 1st degree AV block: prolonged conduction, PR >0.2, QRS normal
Monitor for changes in heart rhythm

b. 2nd degree Type I AVB (weckenback): PR interval prolongs with each beat until QRS drops

c. 2nd degree Type 2 AVB (Mobitz II): severe, PR interval remains consistent and QRS is dropped w/out warning

d. 3rd degree AVB (Complete): no communication between atria/ventricles

i. S&S: palpitations, dizziness, syncope, chest pain, fatigue, diaphoresis, mental status changes

ii. Management: place O2, obtain 12 lead ekg, monitor VS, assess for hemo stability, give atropine/place pacer pads on pt and keep crash cart by room

8. Drugs

a. Digoxin: inc contractibility, slow HR

b. Adenosine: push hard/fast, temporary AV block restoration

c. Atropine: inc HR, SA node firing

d. Epi: inc HR, conduction, contractility, vasodilation

e. Vasopressin: ADH, used in VF/VT

f. Electrolytes: K (3.5-5.0)

Cardioversion vs Defibrillation

Cardioversion	Defibrillation
- Synchronized	- Unsynchronized
- 70-75 (biph)	- 200-360 joules

9. Cardioversion *used in tachy
   a. Synchronized: shock delivered on R wave of QRS, used in hemo unstability (VT pulse, SVT, A Fib, RVR, A Flutter)
      i. Management: remove all nitro from patient, place defib pads on pt, turn on a synch, appropriate voltage, charge paddles, **ALL CLEAR**, shock, reassess
         1. Nonemergent: informed consent, anticoag hx, NPO, sedation
         2. IV access, crash cart, cardiac monitor, pulse ox, bp cuff, O2, anesthesiology at bedside

Nursing Interventions & pt teaching
- going to be sedated
- sign consent
- anticoags
- NPO
- IV access
- labs (Mg & K)
- remove med patches
- may need to hold digoxin

Pacemakers used for brady

10. Defibrillation *used in VT/VF
    a. Unsynchronized shock through the heart to depolarize cells and restart SA node
       i. Monophasic or Biphasic
          - Monophasic: delivers energy in one direction — FIRST!
          - Biphasic: delivers energy in two directions
          - don't forget the gel for conduction
       ii. Management: CPR, used defib, charge paddles, **ALL CLEAR**, shock and resume CPR
    b. Implantable Cardioverter (ICD): implanted for pts with symptomatic VT, threaded through to endocardium, battery powered, 1-3 lead, delivers 25 joules
       i. For: sudden cardiac death survivor, spontaneous VT, life-threatening Dysrhyth
       ii. Management: cath lab, fear/anxiety, if device fires – have defib ready

pt teaching
- follow up appt & remote monitoring
- sexual activity
- driving... cleared by MD

11. Pacemakers – used for brady
    a. Temporary: (Take off for D-Fib!)
       i. Transvenous: leads threaded through R atria to R ventricle
       ii. Epicardial: leads attached to epicardium
       iii. Transcutaneous: pacer pads placed on skin EMERGENT!
    b. Permanent:
       i. SubQ or over pts pectoral muscle
       ii. Leads threaded transvenously through R atrium into one or both ventricles
       iii. Management: done in OR/Cath lab, local anesthesia, ekg monitoring
    c. Terms:
       i. Sensing: generator can see pts intrinsic beat
       ii. Firing: generator delivers pace
       iii. Inhibition: pacer senses own heart beat and inhibits generator firing
       iv. Triggering: pacer sense missed beat and generates response
       v. Capture: heart responds to pace
       vi. Fixed pacing: generator sets an impulse at a fixed rate
       vii. Demand pacing: inhibits pace when pts rhythm is okay
    d. Pacemaker Interrogation
       i. ID pacer rate/mode, look for trends/events, histograms, real-time & stored electrograms

**For ventricular pacing the blip should always immediately proceed the ventricular depolarization wave

Atrial pacing small blip immediately proceed each **P wave**

Line on strip = pacemaker