Cardiovascular System NCLEX Review

Cardiovascular Disorders

Fluid and electrolyte imbalances affecting the heart:

Hypokalemia

- Causes: Vomiting, diarrhea, gastric suctioning, poor nutrition
- Increased cardiac electrical instability, ventricular dysrhythmias
- Increased sensitivity to digoxin
- Muscle weakness and parathesias
- ECG - flattening and inversion of the T wave, the appearance of a U wave, and ST depression

Hyperkalemia

- Causes: renal failure, burns, crushing injuries, potassium supplements
- asystole and ventricular dysrhythmias
- Muscle weakness and paralysis
- Nausea and diarrhea
- ECG – tall peak T waves, widened QRS complexes, prolonged PR, flat P waves

Hypocalcemia

- Causes: Hypoparathyroidism, loop diuretics, renal failure
- Nervous system excitability
- Tetany followed by carpal spasms
- Trousseaus sign
- Chovosteks sign
- Seizures
- can cause ventricular dysrhythmias, prolonged ST and QT intervals, and cardiac arrest

Hypercalcemia

- Causes: hyperparathyroidism, excess calcium intake, immobility
- Sedative effect on nervous system
- Confusion
- Lack of coordination and muscle weakness
- Abdominal pain and distention
- Can cause shortened ST segment and widened T wave,

Hypomagnesemia

- Increased neuromuscular irritability
- Tremors, tetany, seizures

- Depression and confusion
- Dysphagia
- can cause ventricular tachycardia and fibrillation.
- Tall T waves and depressed ST segments.

Hypermagnesemia

- Depressed CNS
- Depressed cardiac impulses
- Muscle weakness
- Hypotension
- Shallow respirations
- Prolonged PR interval and widened QRS complex.

Hyponatremia

- Causes: vomiting, excess water intake, diuretics
- Increased ICP
- Confusion and convulsions
- Muscle cramps
- Nausea and vomiting

Hypernatremia

- Causes: Tube feedings with no water flushes, inadequate water intake, diabetes insipidus
- Excess thirst
- Altered LOC
- Hypertension with normal or increased ECF
- Tachycardia
- Postural Hypotension with decreased ECF

Diagnostics

Holter Monitoring

- ECG tracing recording for 24 hours
- Identifies dysrhythmias
- Evaluates antidysrhythmic or pacemaker therapy.

Echocardiography

- Use to detect valvular abnormalities, congenital heart defects, wall motion, ejection fraction, and cardiac function.
- Transesophageal echocardiograph- prep patient same as endoscopy
- Interventions: determine and advise client to lie still, breathe normally, and refrain from talking

Exercise electrocardiography testing (stress test)

Preprocedure:

- NPO 3 to 6 hours.
- Obtain consent
- Adequate rest
- Light meal 1-2 hours before the test
- Avoid smoking, ETOH, caffeine
- Withhold theophylline products 12 hrs before
- Withhold calcium channel blockers on the day before
- Wear not constrictive clothing, rubber-soled shoes
- Instruct to notify HCP: chest pain, dizziness, SOB during procedure

Preprocedure:

- Obtain consent
- Inform about radioisotope, exposure risk is minimal

Postprocedure:

- Assess VS
- Assess site for bleeding or discomfort
- Fatigue is expected

Cardiac Catheterization

Preprocedure:

- Obtained informed consent
- Assess allergies for seafood, iodine, or radiopaque dyes
- NPO 2-6 hours prior to procedure
- Document VS and peripheral pulses
- Inform client they may feel heat, palpitations, desire to cough when dye is injected.
- Prep the site
- Administer sedatives
- Insert IV line
- Withheld Metformin 24 hours before the test and do not resume until prescribed (48 hours post procedure or after renal function studies)

Postprocedure:

- Monitor vital signs
- Check pulses
- Assess for bleeding
- Bedrest 4-6 hours with insertion site extremity straight

II. Cardiac Disorders

Coronary artery disease

- Narrowing or obstruction of 1 or more coronary arteries due to atherosclerosis, which is an accumulation of lipid-containing plaque in the arteries.

Chronic Causes:

- Nonmodifiable

- Age, genetics, race, men

- Modifiable

- Elevated cholesterol, smoking, hypertension, DM, obesity, substance use

Assessment findings:

- **ECG: ST depression or ST elevation (risk for ischemia)**
- Pain may radiate down left arm, jaw pain may be present and symptom relief with nitroglycerin
- Angina: Chest pain resulting from myocardial ischemia caused by inadequate myocardial blood and oxygen supply

Nursing interventions

- Health promotion and education (diet, exercise, smoking cessation)
- Medication management
- Surgical management

Surgical Interventions:

- Percutaneous transluminal coronary angioplasty (PTCA)
- Laser angioplasty
- Atherectomy
- Vascular
- Coronary artery bypass grafting

Medications:

1. Vasodilators
2. Aspirin
3. Angiotensin receptor blockers
4. Calcium channel blockers
5. Cholesterol-lowering medications
6. Beta-blockers

Myocardial Infarction

Causes:

- Blockage: coronary artery disease (most common)

- Coronary spasms: cocaine or hypertension
- Coronary artery dissection.
- Embolism
- Cardiac Hypertrophy

Workups:

- Troponin I: peaks within 4-12 hours, up to 3 weeks
- CK Level: within 6 hrs, peaks at 18 hrs
- CKMB: first enzyme elevated after MI, peaks at 18-24 hours
- Myoglobin: rises within 1 hour, peaks within 4-6 houts hrs, returns to normal less than 24 hours
- WBC: elevated within 2 days, lasts 1 week.
- ECG- ST elevation, T wave inversion

Signs and symptoms:

- Radiating Chest pain- severe, stabbing, crushing
- Nausea/vomiting
- Acute pulmonary edema
- Cardiac arrest and dysrhythmias
- Cardiogenic shock
- Low grade fever
- Decreased urine output

Interventions

- Thrombolytic therapy (tPA
- Family and client support
- Bedrest to decrease stress on the heart
- Position patient in semi-fowlers
- Monitor Vitals and ABCs
- Monitor intake and output
- Establish IV access
- Administer meds
- Pain management
- Administer o2 as needed
- Prevent complications: dysrhythmias, shock, CHF, PE, recurrent MI
- Teach patient life style modifications

Heart Failure

- The inability of the heart to maintain adequate cardiac output to meet the metabolic needs of the body because of impaired pumping ability.
- Diminished cardiac output results in inadequate peripheral tissue perfusion.
- Congestion of the lungs and periphery may occur; the client can develop acute pulmonary edema.

Right vs. Left Heart Failure

Left-sided HF

- Most common
- Can be **SYSTOLIC or DIASTOLIC**
- **Pulmonary signs and symptoms**

DROWNING

Difficulty breathing

Rales (crackles)

Orthopnea

Weakness

Nocturnal Paroxysmal dyspnea

Increased heart

Nagging cough

Gaining weight

Right-sided HF

- Congested hepatic circ: hepatomegaly, swelling.
- Caused by left sided heart failure, “cor pulmonale”
- Peripheral signs and symptoms

SWELLING

Swelling of legs, hands, liver, abdomen

Weight gain

Edema (pitting)

Large neck veins

Lethargic **I**rregular heart rate (atrial fibrillation)

Nocturia

Girth of abdomen increased

SYSTOLIC- “Left ventricular systolic dysfunction” : issue in ejection fraction (EF); N:50% or

greater

DIASTOLIC **“**left ventricular diastolic dysfunction”: Normal EF

Nursing Interventions:

Assessing

- Assess for worsening symptoms
- Patient responsiveness to medication treatment:
- watch heart rate (Digoxin)
- respiratory status
- blood pressure (vasodilators cause hypotension)
- diuretics (strict intake and output, daily weights, monitor electrolyte levels, especially K+)

Monitoring

- Fluid status
- Cardiac diet
- Fluid restriction
- Lab values: watching BNP, kidney function BUN & creatinine, troponins levels, electrolytes
- Edema in legs
- Safety

Educating

- Early signs and symptoms heart failure exacerbation:
- Low salt and fluid restriction
- Vaccination to prevent illness, such as annual flu and to be up-to-date with pneumonia vaccine
- Exercise aerobic (as tolerated)
- Daily weights
- Compliance with medications
- Smoking cessation
- Limiting alcohol

Cardiogenic Shock

What happens during Cardiogenic shock?

decreased stroke volume -> decreased cardiac output -> decreases perfusion to the body’s cells that make up our organs and tissues = cell injury

Signs and symptoms:

Heart

- Back flow of blood from the left side to the lungs (*pulmonary congestion,* crackles*, dyspnea, increased respiratory rate, low oxygen, increased heart rate*)

- As it progresses, blood will back flow from the lungs to the right side of the heart *(neck veins become distended due to an increase in venous pressure and there will be a high CVP…central venous pressure)*
- *Chest pain*
- *Hypotension*
- *Weak peripheral pulses*

Brain: leads to confusion, agitation, restlessness

Kidneys: Water retention and oliguria, renal failure

Skin: decreased capillary refill, cool, pale, and clammy skin

Nursing Interventions:

- Hemodynamic monitoring (more about this below)
- maintain mechanical ventilation
- Central line placement for medication,
- monitoring, assessing for signs of adequate tissue perfusion:
- mental status,
- vital signs
- intake and output
- lung sounds
- Monitor lab values- increased BNP, troponin, ABG