College of Nursing
**UNIVERSITY OF THE PHILIPPINES MANILA**
The Health Sciences Center

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# N-4: Basic Pathophysiology

2nd Semester, AY 2023-2024

## ACADEMIC INTEGRITY

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# ACTIVITY: CREATING A PATHOPHYSIOLOGY DIAGRAM

## CASE 1: ACUTE CORONARY SYNDROME

**History of Present Illness**
Your patient is a 64-year-old man admitted to the Emergency Room (ER) due to severe chest tightness. On history, you noted that he was diagnosed with diabetes mellitus type 2 (x 30 years), systemic hypertension (x 35 years), and a previous heart attack 5 years ago (no coronary intervention done).

When you interviewed him further, he reported that he had been experiencing chest pains over the past couple of months. Initially, his chest tightness would be relieved with rest but he eventually would need to take his sublingual nitroglycerin tablet for relief over the last month. He has been helping his daughters with their house transfer for the past two days where he has been lifting furniture and driving long distances. This morning at around 4 AM he awoke to sudden pressing pain (VAS 9/10) over his anterior chest, radiating to his jaw and left arm. He reported cold sweats, difficulty breathing, and dizziness. His wife gave him his usual nitroglycerin sublingual tablet but did not offer any relief. He tried to rest but despite three doses of nitroglycerin tablet over 30 minutes, his symptoms only worsened. This prompted his family to rush him to the ER.

**Review of Systems**
- **General**: (-) fevers and chills; (-) weight loss.
- **Skin**: Diaphoretic.
- **HEENT**: (-) nasal congestion; (-) throat pain.
- **Pulmonary**: (-) cough; (-) hemoptysis; (+) Dyspnea with chest pain.
- **Cardiovascular**: (+) orthopnea, (+) paroxysmal nocturnal dyspnea, (-) lower-extremity edema, light-headedness, or palpitations.
- **Gastrointestinal**: (+) Nausea during the chest pain episodes; (-) vomiting
- **Genitourinary**: (-) hematuria
- **Musculoskeletal**: (-) muscle aches, joint pain, or stiffness.
- **Neurologic**: (-) syncope, progressive weakness or loss of sensation.
- **Psychiatric**: (-) delusions, hallucinations

**Past Medical History**
- **Medical history**:
    - (+) Diabetes mellitus type 2 (x 30 years); Metformin 500mg/tablet twice daily; Empagliflozin 10 mg/tablet once daily

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    - (+) Systemic hypertension (x 35 years); Telmisartan + Amlodipine 40mg/5mg tablet once daily; Metoprolol 50mg/tablet once daily
    - (+) Previous MI (10 years ago); ISMN 30mg/tablet once daily; Clopidogrel 75mg/tablet once daily; Atorvastatin 40mg/tablet once daily at bedtime; Trimetazidine 35mg/tablet once daily
- **Surgical history**: None.
- **Allergies**: No known drug allergies.
- **Family history**: (+) MI, brother died at 60 years old
- **Social history**:
    - Bank manager; working long hours
    - Smoker since 30 years old consuming ~5-10 sticks/day. Stopped 5 years ago after his brother died.
    - Denies illicit drug use
    - Social alcoholic beverage drinker

**Physical Examination**

- **General appearance**: Awake, conscious, coherent, oriented; BMI 24
- **Vital signs**:
    - Temperature: 36.3° C
    - Pulse: 98 beats/min, regular
    - Left Arm: 92/60 mmHg
    - Respirations: 22 cycles/min
    - Oxygen saturation: 92% on room air
- **Skin**: Cool to touch; (-) pallor, cyanosis
- **HEENT**: (+) Neck vein engorgement; (-) cervical lymphadenopathy
- **Pulmonary**: Equal chest expansion; (+) bibasal fine crackles; (-) wheezes
- **Cardiovascular**: Adynamic precordium; Distinct heart sounds, S1>S2 (apex), S2>S1 (base); PMI at 5th ICS anterior axillary line. Normal rate and regular rhythm.
- **Gastrointestinal**: Flabby; normoactive bowel sounds; soft; (-) tenderness on palpation
- **Genitourinary**: (-) costovertebral angle tenderness
- **Musculoskeletal**: (-) bipedal edema
- **Neurologic**: Alert, oriented; (-) focal motor or sensory deficits; E4V5M6
- **Mental status**: Appropriate mood and behavior.

**Laboratory results:**

- Cardiac Enzymes (High Sensitivity Troponin I): Elevated
- 12-lead ECG: ST-segment elevation over V1 - V4, left axis deviation, left ventricular hypertrophy (LVH) by voltage criteria
- Chest radiograph (PA view): (+) congestive changes; cardiomegaly
- CBC: Normal

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- CBG (non-fasting): 191 mg/dl

**Admitting impression:**
Hypertensive Cardiovascular Diseases (HCVD), ACS STEMI, Killip 3, NYHA FC III
Diabetes Type 2, non-obese, non-insulin requiring

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## CASE 2: CHRONIC KIDNEY DISEASE

**History of Present Illness (HPI)**
A 62-year-old man with CKD Stage V, reliant on hemodialysis, presents with fever and difficulty of breathing. He has missed several dialysis appointments due to lack of financial resources, leading to significant fluid congestion. He also reports occasional mild substernal chest pressure coinciding with the breathlessness. The pressure is localized, non-radiating, and not associated with nausea or sweating. Notably, there is an evident increase in leg swelling.

**Past Medical History**
- **Medical history**: Hypertension, hyperlipidemia, type 2 diabetes mellitus
- **Surgical history**: Insertion of left internal jugular vein catheter (3 months PTA)
- **Medications**: Amlodipine, Losartan, Simvastatin, Metformin, Calcium carbonate, Ferrous Sulfate, Sodium bicarbonate, Erythropoietin
- **Allergies**: No known drug allergies.
- **Family history**: Father had hypertension. Mother had type 2 diabetes mellitus.
- **Social history**: Patient is married and used to be a market vendor. He was a smoker for 20 pack years and occasional alcoholic beverage drinker.

**Significant History and PE findings:**
- **General appearance**:
  - Drowsy, irritable, dyspneic and has generalized weakness.
  - He generally feels fatigued and has decreased ability to perform activities of daily living.
- **Vital signs**:
  - Temperature: 38.2° C
  - Pulse: 110 beats/min
  - Blood Pressure: 155/86 mm Hg
  - Respirations: 26/min
- **Skin**: (+) Ashen gray skin color. (+) pale nail beds. No rashes.
- **HEENT**:
  - No vision changes, ear pain, nasal congestion or discharge, or sore throat.
  - Nares patent, no discharge; oropharynx clear.
- **Neck**:
  - (+) neck vein distention
  - With left internal jugular vein catheter: (+) erythema, tenderness around insertion site
- **Pulmonary**: (+) rales on auscultation
- **Cardiovascular**:
  - Occasional mild substernal chest pressure.

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    - Tachycardic with regular rhythm, normal $S_1$ and $S_2$.
    - No murmurs, extra heart sounds, rubs or gallops.
- **Gastrointestinal**:
    - Poor appetite
    - No abdominal pain, nausea, vomiting, or change in bowel patterns
    - Soft, nontender, (+) fluid wave
    - Normal bowel sounds are present in all quadrants.
    - Rectal exam: Nontender, stool heme negative.
- **Genitourinary**: Has not produced urine for months since beginning dialysis.
- **Extremities**:
    - 2+ pitting edema to mid-shin bilaterally, no tenderness or erythema.
    - 1+ dorsalis pedis pulses bilaterally
    - Weak upper and lower extremities
- **Neurologic**: No headaches, dizziness, or seizures reported. Patient is lethargic, disoriented to time and is able to obey commands.
- **Mental status**: No reported symptoms of depression, anxiety, or any psychiatric condition

**Laboratory & Diagnostics:**

- Complete Blood Count (CBC):
    - Hemoglobin: 9.2 g/dL (low)
    - Hematocrit: 27.8% (low)
    - White Blood Cells (WBC): 15,000 cells/µL (elevated)
    - Platelets: 150,000 cells/µL (normal)
- Basic Metabolic Panel (BMP):
    - Sodium (Na+): 132 mEq/L (slightly low)
    - Potassium (K+): 6.5 mEq/L (elevated)
    - Chloride (Cl-): 98 mEq/L (normal)
    - Bicarbonate (HCO3-): 18 mEq/L (low, metabolic acidosis)
    - Blood Urea Nitrogen (BUN): 85 mg/dL (elevated)
    - Creatinine: 9.1 mg/dL (elevated)
    - Glucose: 186 mg/dL (elevated)
- Additional Electrolytes:
    - Calcium (Ca2+): 7.8 mg/dL (low)
    - Phosphate (PO4-): 6.2 mg/dL (elevated)
    - Magnesium (Mg2+): 3.1 mg/dL (elevated)

  Blood Cultures: Pending
- ECG: peaked T waves

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## CASE 3: INTRACRANIAL BLEED

**History of Present Illness**

A man who appears to be in his 60s is brought to the emergency department. The history is given by emergency medical technicians (EMTs), who state they were called to a store for a 65-year-old man who possibly had a stroke. At the store, they found him lying on the ground unconscious but breathing normally. After their arrival, the patient woke up drowsy but was unable to give coherent responses to questions or commands.

Store employees who saw the patient reported to EMTs that he fell to the ground suddenly from a sitting position, then began drooling, and his arms and legs shook for what seemed to be a long time, but they cannot quantify how long. They stated that he had not appeared ill before the event.

**Review of Systems & Past Medical History**

Patient is unable to provide any information at this time

**Physical Examination**

- **General appearance**: Awake; saliva and blood at the corner of his mouth. He appears well-developed, and appearance is consistent with stated age.
- **Vital signs:**
  - Temperature: 36.5° C (97.7° F)
  - Pulse: 80 beats/min and regular
  - BP: 165/90 mm Hg
  - Respirations: 20/min
- **Skin**: Pink, warm, and dry
- **HEENT**: No evidence of head trauma. Tympanic membranes are clear; HEENT exam is otherwise unremarkable.
- **Pulmonary**: No respiratory distress. Equal breath sounds bilaterally with good air entry/exit; no wheezing.
- **Cardiovascular**: Regular rate and rhythm. Normal $S_1$ and $S_2$. No murmurs.
- **Gastrointestinal**: Unremarkable
- **Genitourinary**: Unremarkable except for urine on trousers.
- **Musculoskeletal**: Full range of motion of right upper and lower extremities; no deformities, tenderness, or bruises. With weakness of left upper and lower extremities (muscle strength of 2/5).
- **Neurologic**: Pupils are 3mm equal and briskly reactive to light with no nystagmus. Face appears asymmetric; gag reflex is present and symmetric. There is (+) slurring of speech. The patient is able to follow simple commands. Deep tendon reflexes are symmetric and 2+ throughout; (-) Babinski, (-) Brudzinski, (-) Kernig's signs.

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- **Mental status**: Drowsy; eyes open to verbal stimulus. Oriented only to name; gives confused, incoherent responses to other questions; follows simple commands using the right upper limb.

Shortly after initial examination, the patient becomes extremely lethargic. He responds to deep pain by withdrawing. He is noted to have the following: heart rate 57 beats/min, BP 147/52 mm Hg, respirations 12/min, and pulse oximetry 91% on room air. His pupils are 3 mm equal and briskly reactive to light.

Appropriate testing is done and results are shown:

- Normal sinus rhythm at 58 beats/min on cardiac monitor
- Pulse oximetry: 96% on facemask at 8 lpm
- ECG: Sinus rhythm; no signs of arrhythmia or ischemia
- Random blood glucose: 148 mg/dl (high)
- Complete Blood Count:
    - Hemoglobin: 15.2g/dL (normal)
    - Hematocrit: 45.4% (normal)
    - WBC: $14.7 \times 10^9$/L (high)
- Serum chemistry profile: Normal
- ECG: Sinus rhythm; no signs of arrhythmia or ischemia
- Lipid profile: pending results

The patient's family has now arrived at the hospital. They state that:

- **Medical history**: Osteoarthritis; Hypertension (15 years); no recent hospitalizations
- **Surgical history**: Tonsillectomy during childhood
- **Medications**: Aspirin as needed; Carvedilol 6.25 mg tablet twice a day
- **Allergies**: No known drug allergies
- **Family history**: Hypertension (father) - died at age 61 years old due to stroke; Type 2 diabetes mellitus (mother)
- **Social history**: Social drinker; no other recreational drug use; smokes 1-2 sticks of cigarette per day. No recent travel. Employed as a lawyer, married with children.

**Cranial CT scan:** Intraparenchymal hemorrhage in the right parietal area

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## CASE 4: DIABETES MELLITUS

### History of Present Illness

A 56-year-old woman who is a long-time patient in the clinic returns for a scheduled follow-up of her type 2 diabetes and chronically elevated blood glucose. At her last visit 3 months ago, her HbA1C was 9.6%, where it had been more than 8% for the past several visits. The physician recommended beginning treatment with insulin, which she refused because of her fear of needles. She was also ordered to have an increased dose of her oral anti-diabetic drug (Glimepiride from 4 mg to 8 mg once a day), and was advised to strictly follow her diet and exercise regimen, which she claims to be doing. Since the last visit, her home capillary blood glucose levels have ranged from 119 mg/dL to 263 mg/dL (6.6 to 14.6 mmol/L) and her weight on her home scale had changed from 90 to 92 kg. She describes increased thirst and urination, but denies blurry vision or lethargy. She shows a non-healing wound on her right foot, which she suspects to be due to her stepping on broken glass while cleaning the house almost two weeks ago.

A capillary blood glucose test at the clinic today shows her glucose level of 221 mg/dL (12.27 mmol/L) and hemoglobin A1C of 12.1%.

### Review of Systems

- **General**: Increased thirst and drinking more water. Appetite is normal and her weight at home has changed after three months. She denies lethargy, fever, chills, or night sweats.
- **Skin**: No rash, pruritus, or lesions
- **HEENT**: No change in vision, sore throat, dysphagia
- **Pulmonary**: No cough, shortness of breath, wheezing
- **Cardiovascular**: No chest pain, pressure, or discomfort; no orthopnea, dyspnea on exertion, or paroxysmal nocturnal dyspnea.
- **Gastrointestinal**: No abdominal pain, nausea, vomiting, diarrhea
- **Genitourinary**: Increased urinary frequency without urgency, dysuria, or blood in urine. No vaginal discharge or itching.
- **Musculoskeletal**: No joint or muscle pain. Left lower extremity has no sores or lesions; Right sole has a non-healing wound, swollen, warm to touch, with foul-smelling yellowish discharge, decreased sensation
- **Neurologic**: Has numbness and tingling in both feet that comes and goes throughout the day. No headache, tremor, change in gait.
- **Psychiatric**: No mood swings, depression, or anxiety.

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**Past Medical History**

- **Medical history**: Hypertension, type 2 diabetes mellitus, hyperlipidemia, and obesity; Gestational diabetes mellitus in her first pregnancy
- **Surgical history**: Cholecystectomy 5 years prior
- **Medications**: Metformin, Atorvastatin, Glimepiride, Losartan
- **Allergies**: Penicillin, which causes rash
- **Family history**: Father died from myocardial infarction at age 69 years, mother age 74 years has type 2 diabetes mellitus, hypertension, and hyperlipidemia.
- **Social history**: Patient works as an office clerk, and spends 8 hours sitting. has never smoked cigarettes, denies any illicit drug use, drinks 2 to 3 glasses of alcoholic beverage per week. At the time of initial diagnosis, the patient states that she does not understand why she has diabetes since she never eats a lot of sugar. Instead, her usual meals include 2 cups of rice and a viand, usually pork or beef. Her favorite breakfast is 4 slices of white bread with margarine spread. She is married and has a 12-year-old son.

**Physical Examination**

- **General appearance**: Well-kempt in no apparent distress, height 5'5", weight 92.3 kg
- **Vital signs**:
    - Temperature: 37° C
    - Pulse: 82 min
    - BP: 159/88 mmHg
    - Respirations: 16/min
- **Skin**: There is hyperpigmentation in neck folds and under arms; no other lesions or rash. There is also a non-healing wound at the right sole around 2 inches in size, with redness and pus-like discharge, with decreased sensation
- **HEENT**: Moist mucous membranes, no exudates, no cervical lymphadenopathy.
- **Pulmonary**: Clear to auscultation bilaterally, no wheezes, rales, or rhonchi.
- **Cardiovascular**: Regular rate and rhythm; no murmurs, gallops, or rubs. No jugular vein distention.
- **Gastrointestinal**: Obese abdomen, soft, non-distended, normal bowel sounds, no rebound or guarding.
- **Genitourinary**: No signs of yeast infection or other lesions. No tenderness to flank percussion.
- **Musculoskeletal**: No peripheral edema, swelling or tenderness. Joints full range of motion and nontender. Right foot has dorsalis pedis pulses 2+.

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- **Neurologic**: Decreased sensation to light touch in feet bilaterally. Normal gait, muscle strength 5/5 throughout.
- **Mental status**: Alert and oriented to three spheres

**Serum Laboratory Results:**

- HbA1C: 12.1% (elevated)
- Fasting Blood Sugar: 209 mg/dl (elevated)
- Sodium: 138 mEq/L (normal)
- Potassium: 4.1 mEq/L (normal)
- Creatinine: 0.7 mg/dL (normal)
- BUN: 23 mg/dL (normal)
- Lipid profile:
  - Total cholesterol: 222 mg/dl (elevated)
  - HDL cholesterol: 48 mg/dl (low)
  - LDL cholesterol: 114 mg/dl (elevated)
  - Triglycerides: 177 mg/dl (elevated)