Dyspnea
Sources: UST-FMS Med1 Lecture (October 24, 2014) by Dr. Marcellus Francis L. Ramirez, MD

Black - powerpoint slides
Pink - lecture trans

Dyspnea
- Old patient: Dyspnea mistaken as Chest pain
- Easy Fatigability: Dyspnea upon exertion

3 CATEGORIES OF OPD PATIENTS w/ DYSPNEA
1. Mild form of dyspnea – patient gives you the complaint, but he still can finish his sentence
2. More urgent form – patient speaks in phrases; bring the patient to the ER!
3. Most severe - relative tells about the complaint, the patient cannot come to you; emergency!

OUTLINE: DYSPNEA
1. Definition
2. Pathophysiology and Mechanisms
3. Patterns of dyspnea
4. Approach to the patient
   a. History
   b. Physical examination
   c. Ancillary tests
5. Differentiating between Cardiac and Pulmonary cause of dyspnea

DYSPNEA COMPLAINTS (Varied forms)
- Difficulty of breathing
- Shortness of breath
- “Nahihirapan huminga”
- “Hirap huminga”
- “Hinihingal”
- “Mabilis mapagod”
- “Mabilis hingalin”

DYSPNEA
- Difficult or labored respiration, or the unpleasant awareness of one’s breathing
- Induce secondary physiological and behavioral responses
- A symptom (IMPORTANT! It is different from tachypnea)
- Must be distinguished from the signs of increased work of breathing

American Thoracic Society definition
- “subjective experience of breathing discomfort that consists of qualitatively distinct sensations that vary in intensity” (mild, moderate, severe)
- Dyspnea triggered by many factors

PATHOPHYSIOLOGY
The receptors (see below) send signals to you sensory cortex and respiratory centers, which sends signals to your motor cortex to increase breathing (ventilator muscles).
- Chemoreceptors - carotid bodies, respond to changes in CO2, O2 and pH
- Mechanoreceptors – brochial airway
- Metabo receptors – muscles, respond to changes in local milieu
- J-receptors – pulmonary interstitium, responds to fluid in your interstitial tissue (pulmonary congestion)

CLINICAL PRESENTATIONS
(see picture below)
1. Chest tightness
2. Increased work of breathing
3. Air hunger
4. Unsatisfying breath
5. Rapid breathing
ANXIETY

- Increases the severity of dyspnea
- Lead to patterns of breathing that heighten physiologic abnormalities in the respiratory system
- In patients with expiratory flow limitation, leads to hyperinflation, increased work of breathing, a sense of increased effort to breathe, and a sense of an unsatisfying breath

DYSPNEA (SENSORY INTENSITY)

1. Modified Borg scale (parang pain scale, yung 1-10)
2. Visual analogue scale (point to the scale what amount of effort induces the dyspnea)
   - Can be utilized to measure dyspnea at rest, immediately following exercise, or on recall of a reproductive physical task, e.g. climbing the stairs at home
3. Alternative approach → inquire about the activities a patient can do, i.e., sense of the patient’s disability
   - Baseline Dyspnea Index, Chronic Respiratory Disease Questionnaire

After that, important yung follow-up. To see how much is the patient responding to your treatment.

ALGORITHM OF DYSPNEA

As a clinician, it is important to classify the dyspnea if it is due to cardiac or pulmonary causes.
CARDIOVASCULAR
Prototype: Congestive heart failure
Can be divided into low output, normal and high

1. **Low output**: poor contractility, systolic dysfunction, problem in contraction
2. **Normal output**: diastolic dysfunction, problem in relaxation (you have stiff ventricles)
3. **High output**: low O2 carrying capacity, increased metabolic demand

**APPROACH TO A PATIENT WITH DYSPNEA**

**HISTORY**

- Patient should be asked to describe in his/her own words what the discomfort feels like (parang nalulunod?)
- Onset: acute or chronic (majority of patients would tell the onset of just the severe symptoms. Verify! Ask “So ibig sabihin po Nay, before 2 weeks, okay po kayo?”)
- Persistent or intermittent (In between, are there any episodes of other symptoms?)
- Severity and progression (5 steps → 2 steps → 1 step na lang)
- Effect of position (dyspnea patterns, see below!), and environmental stimuli on the dyspnea
- Concomitant symptoms and conditions

**APPROACH TO THE PATIENT: DYSPNEA**

- Is the dyspnea present on effort or even when the patient is resting?
- How much effort induces the dyspnea? Distance of walking? Flight of stairs?
- Is it necessary to stop and rest while climbing upstairs? (do they need to stop in between)
- With what other activities of daily life does dyspnea begin? With what level of physical demand? (i.e. while brushing teeth, while speaking) (for people with sedentary lifestyle; if you interview the patient, he speaks in phrases)
- Comorbid conditions
- Risk factors of CAD
  - HPN, Diabetes, Smoking, Dyslipidemia, Obesity, Age, Family History
- Risk factors for occupational lung disease
  - Anong work ng patient?

Concomitant cardiac symptoms

- Chest pain
- Palpitations
- Syncope, dizziness

Other symptoms of heart failure

- Edema
- Nocturia (rare but important)
- Jaundice
- Signals of portal hypertension
- Upper abdominal discomfort due to hepatosplenomegaly
- Manifestations of hepatic congestion (jaundice, portal HPN)
- Other nonspecific symptoms: weakness, body malaise
- Cachexia of heart failure

**DYSPNEA: PATTERNS**

**Dyspnea: PATTERNS**

1. May occur at rest or with exertion
2. At recumbency (ORTHOPNEA)
3. Even with standing (PLATYPNEA)

**ONSET of Dyspnea**

1. Acute sudden
2. Chronic progressive
Acute dyspnea | Chronic dyspnea
---|---
- Acute pulmonary edema (MI or Myocardial Infarction), ischemia, hypertensive crisis) | - Chronic heart failure (progresses with less and less effort)
- Pneumothorax (air in pleural space, unilateral chest pain) | - Chronic pulmonary disease (COPD, asthma, interstitial lung disease, CA)
- Pulmonary embolism (seen in hospitalized patient, prolonged bed rest) | - Anxiety (chronic recurrent)
- Pneumonia (fever, cough, dyspnea) | - Obesity
- Airway obstruction (emergency! Heimlich maneuver, CPR) | - Poor physical fitness
- Hyperventilation (acute anxiety)

**Acute intermittent episodes of dyspnea**
- Episodes of MI
- Bronchospasm
- Pulmonary embolism
- “dyspnea of sudden onset”

**Chronic persistent dyspnea**
- COPD
- Interstitial lung disease
- Chronic heart failure

**DYSPNEA ON EXERTION**
- Earliest form in patients with heart failure
- Easy fatigability
  - Progressive
  - Dyspnea is progressively induced by less effort
  - Walking 1 Km → Walking ½ Km → Walking a few meters → At rest (Usual progression for heart failure)
  - Climbing 3 flights of stairs → 1 flight of stairs → a few steps → At rest

**ORTHOPNEA**
- Dyspnea occurs in the recumbent position with relief by sitting upright or standing
- Patients learn to use one or more extra pillows to combat their sense of breathlessness
- Number of pillows used by the patient is a good way to semiquantify orthopnea, i.e., 2-pillow orthopnea, 3-pillow orthopnea
- Picture: Left (false) and Right (true orthopnea)

**PAROXYSMAL NOCTURNAL DYSPNEA (PND)**
- Acute episodes of severe dyspnea (and coughing) during sleep, commonly 2 to 3 hours after going to sleep in the supine position (patient suddenly wakes up, sometimes with wheezing)
- Relieved by assuming the upright position
- Can gradually improve (over 10 to 20 minutes) by getting out of bed or sitting on the side of bed (symptoms do not relieve immediately)
- Dyspnea usually does not recur after the patient goes back to sleep (associated with other symptoms, cardiac asthma)
- Classic sign of INTERSTITIAL PULMONARY EDEMA
- Most commonly due to HEART FAILURE relatively specific symptom of left-sided heart failure
- Mechanism: increase in central blood volume in the supine position (same as orthopnea)

**PLATYPNEA**
- Kabaligtaran ng Orthopnea
- Dyspnea in the upright position with relief in the supine position
- Two notable etiologies:
  1. Left atrial myxoma – tumor in the LA, the tumor goes down, obstructs the valve
  2. Hepatopulmonary syndrome – in patients with liver failure (pulmonary arterio-venous connections, VQ mismatch when patient is standing up)
- *Atrial myxoma – may present with sudden dyspnea while sitting rather than recumbent

**TREPONEA**
- Dyspnea that is sensed while lying on one side but not the other
- Left or right lang
- Patient goes to other side to relieve dyspnea
DYSPNEA ON CAD

- **DYSPNEA ON EXERTION**
  - As a sole symptom may be angina equivalent *(dyspnea lang, walang angina)* (➔ coronary artery disease)
  - Angina + Dyspnea ➔ increased likelihood of a large myocardium involved *(worst prognosis)*
  - May occur in the absence of chest pain in patients with acute MI *(atypical presentation)*
  - Usually in women, elderly, and diabetics *(Diabetic autonomic neuropathy, atypical)*

SLEEP APNEA

- Important trigger of pulmonary HPN
- Episodes of snoring with prolonged periods of apnea due to upper airway obstruction
- Typically occurs in patients who are overweight or mildly obese
- Diagnosis can only be supported by obtaining a history from the patient’s spouse or significant other

“The patient’s pattern should be questioned about any signs of sleep-disordered breathing, such as loud snoring and/or periods of apnea.”

Ask the patient’s sleeping partner. Loud snoring? Periods of apnea? Ilang seconds sya di humihinga. You refer them to a sleep specialist.

Patient goes like this: “hucck hiick huuuck hiickk... eeeh...” Ayun ung sleep apnea, ung “eeeeh”

CHEYNE-STOKES RESPIRATION

- Shallow respiration ➔ increase in rate and depth ➔ hyperpnea ➔ decreasing rate and depth of respiration ➔ period of apnea that can last 15 seconds or longer
- Periods of hyperpnea followed by apnea
- Feature of the elderly with heart failure, often with concomitant cerebrovascular disease
- Often occurs during sleep without the patient’s awareness and is often reported by others

Patient’s breathing is rapid, increase intensity, then shallow, very irregular. Very irregular ➔ Cheyne Stokes! May periods of apnea pa.

Cheyne-Stokes: Neurologic problem din to (kaya pala sya tinanong nung Neuro haha).
CARDIAC OR PULMONARY?

Distinguishing between a cardiac or pulmonary cause may be a challenge.

**Heart failure** - onset of dyspnea is insidious and frequently precipitated by exertion

**Asthma or obstructive airway disease** - suggested by wheezing, and prior episodes responsive to bronchodilators

COUGH

- Cough is NOT exclusive to a pulmonary cause!
- Cough (if it occurs) follows the dyspnea in heart failure
- **HEART FAILURE:** Dyspnea, then Cough
- **COPD:** Cough, then Dyspnea
- Dry, unproductive cough, occurring with effort or at rest, can be related to the pulmonary congestion associated with heart failure.

PRODUCTIVE COUGH

- Acute pulmonary edema - frothy, pink-tinged sputum (remember the FROTHY! You will see this in your internship)
- **Mitral stenosis** - blood streaked sputum
- Chronic bronchitis - white and mucoid sputum (delicious looking! White and mucoid, parang Bavarian!)
- **Pneumonia** - thick and yellow
- Pulmonary infarction - bloody
- Lung CA or bronchiolectasis - bloody

After History, we go to the PE:

**PHYSICAL EXAMINATION**

- Should begin during the interview of the patient

**Clinical Clues**

- Inability of the patient to speak in full sentences before stopping
- Evidence for increased work of breathing
- Unusual tripod position of a COPD patient (see picture)

**GENERAL SURVEY**

- Check the posture of the patient
- Signs of anemia (pale conjunctivae)
- Signs or respiratory distress
- Cyanosis (ER agad!)
- Cirrhosis (Spider angiomata, gynecomastia)
- Cardiac: take note of distended neck veins
- Comfortable ba? Anxious?
- Oxygen via cannula ← severe congestive heart failure, quite apprehensive
VITAL SIGNS

- BP – stable, hypotensive, hypertensive
- HR – tachycardic, bradycardic
- Accurate assessment of the respiratory rate should be obtained (one full minute)

VERY IMPORTANT! RESPIRATORY DISTRESS!
Assess severe respiratory distress and impending signs or respiratory failure and address these immediately!

1. Altered sensorium
2. Cyanosis
3. Hypotension
4. Paradoxical breathing
5. Severe dyspnea

EXAMINATION OF THE CHEST

- Focus on symmetry of movement
- Cardiac and pulmonary examination
- Percussion
  - Dullness – pleural effusion
  - Hyper-resonance – sign of emphysema
  - Unilateral hyperresonance - pneumothorax
- Auscultation
  - Adventitious breath sounds: Wheezes, rales, rhonchi, prolonged expiratory phase, diminished breath sounds → clues to disorders of the airways, and interstitial edema or fibrosis
- In heart failure, the ff. are usually BILATERAL:
  - Pleural Effusion – may be unilateral, frequently on right side
  - Crackles/Rales – if present, in patient without concomitant lung disease, are usually specific for heart failure (Eto ung part na biglang parang may malakas na kulog. Breath sound pala un.)

HEPATOJUGULAR REFLEX

If normal si JVP, you can do this maneuver. It involves pressure on right upper quadrant. Use BP cuff, 20 mmHg. Observe for increase in JVP of 3 cm or more. It denotes congestive heart failure.

- (+) Hepatojugular reflex – part of Framingham (?) criteria for heart failure

CARDIAC EXAMINATION

- Signs of elevated right heart pressures
  - Jugular venous distention, elevated JVP
  - Edema
- Cardiomegaly – displaced apex beat (enlargement), diffuse (hypertrophy), sustained (LVH) (hypertrophy din! Nakasulat na nga daw eh), LV heave (LVH)
- RV heave (RVH)
- Signs of left ventricular dysfunction (S3 and S4 gallops)
- Murmurs

Check for edema, elevated JVP (evident jugular wave forms), signs of hepatic congestion, portal hypertension, visible veins in abdomen.

Recall: JVP

Wave form before S1: a wave
Wave form after S1: v wave ← severe tricuspid regurgitation! “GIANT V WAVE”
**ABDOMINAL EXAMINATION**

- Abdomen (patient in supine position)
  - Note for paradoxical movement of the abdomen (inward motion during inspiration), a sign of diaphragmatic weakness

- **Hepatomegaly** – important sign in patients w/ HF
  - Enlarged liver is frequently tender
  - May pulsate during systole if *tricuspid regurgitation* is present
- Ascites – late sign
- Jaundice – late sign

**EXAMINATION OF THE EXTREMITIES**

- Edema (usually pitting)
- Unilateral leg edema → prolonged bed rest, not due to heart failure, PULMONARY EMBOLISM due to deep vein thrombosis
- Clubbing of digits – indication of interstitial pulmonary fibrosis, COPD or congenital heart disease

- Patients with exertional dyspnea should be asked to walk under observation in order to reproduce the symptoms

**RADIOGRAPHIC FINDINGS (CHEST X-RAY)**

- Hyperinflation
- Pulmonary infiltrates
- Pleural effusion

To assess for cardiomegaly: check CARDIAC SHADOW
Cardio-Thoracic Ratio: 0.5

- The patient should be examined for new findings that were not present at rest and for oxygen saturation

(eto na ung part na may video na nanggulat. Para daw magising tayo)
- Normally, you should be able to fit one vertebral body in the retrocardiac space (retrocardiac, sa likod ng heart). If not, you have cardiomegaly
- Retrosternal space should only be occupied by the 1/3 of the cardiac shadow.

**Chest Radiograph**

- **Lung volumes** should be assessed
  - Hyperinflation: obstructive lung disease
  - Low lung volumes: interstitial edema or fibrosis, diaphragmatic dysfunction, or impaired chest wall motion
- **Pulmonary parenchyma** should be examined for evidence of interstitial disease, pulmonary infiltrates and emphysema

- Check **pulmonary vasculature**
  - Prominent pulmonary vasculature in the upper zones → pulmonary venous HPN
  - Enlarged central pulmonary arteries (in the hilar areas) → pulmonary artery HPN

- Flattened diaphragm → emphysema
- Pneumonitis → may infiltrates

- Upper zones: Blood vessels are prominent (hepatization)

- Kerley's B lines – horizontal lines on lower third of lung parenchyma

- Kerley's B lines (Zoomed in)
Pulmonary edema vs Pneumonia: hard to differentiate, basta maraming infiltrates

Other tests

- Cardiac imaging: echocardiogram (assesses structure and function)
- Biomarkers: BNP (cardiac), N-terminal pro-BNP
- Pulmonary function tests

Echo: Inward contraction of ventricles, abnormal: hypokinesia; exact chamber size, heart function, contractility
Thrombus may also be seen in echo. Sorry di ko napicturan hehe.

Cardiopulmonary exercise test – to determine which system is responsible for the exercise limitation

EVALUATION OF DYSPNEA

“When you hear hoofbeats, think of horses, not zebras.”

- Cardiac clues → must be CARDIAC cause
- Pulmonary clues → must be PULMONARY cause
- When heart and lung disease coexist, determination of the relative contribution of pulmonary and cardiac dysfunction to dyspnea can be very difficult
SAMPLE CASE #1: **PULMONARY**

- 60 M
- 6 years – intermittent cough productive of whitish sputum x 6 years
- 4 years - easy fatigability: exertional dyspnea on walking 2 flights of stairs
- 2 years – dyspnea on walking 1 flight of stairs
- 6 months – dyspnea on walking several meters
- 60 pack years smoking history

(cont)

- PE: conscious, coherent, speaks in phrases, prefers upright leaning forward position
- BP 110/70 mm Hg, HR 105 bpm regular, RR 28/min, T 37.2 C
- Symmetrical chest expansion, (+) supraclavicular and intercostal retraction, hyperresonant on both lung fields, (+) crackles on right lower lung field

Upward leaning position → orthopnea
Bilateral hyperresonance → emphysema

SAMPLE CASE #2: **CARDIAC**

- 60 M
- 1 year – intermittent substernal chest heaviness
- 6 months – exertional dyspnea on walking 2 flights of stairs
- 4 months – PND, 2 pillow orthopnea, intermittent dry cough, edema
- 3 months – dyspnea on walking several meters
- 1 week – dyspnea at rest

Heart failure: progressive

- PE: conscious, coherent, speaks in phrases
- BP 150/90 mm Hg, HR 110 bpm regular, RR 26/min, T 37.2 C
- Distended neck veins
- Symmetrical chest expansion, (+) supraclavicular and intercostal retraction, resonant on percussion on both lung fields, (+) crackles on both lower lung fields
- JVP 5 cm at 40 degree angle; carotid – brisk upstroke gradual downstroke, normal amplitude
- Dynamic precordium, AB 6th LICS AAL, diffuse; soft S1 at apex, (+) S3
- ++ bipedal edema

Distended neck veins! Bilateral crackles → CARDIAC!
S3 → HEART FAILURE

Echo: Multichamber dilatation
<table>
<thead>
<tr>
<th>NYHA CLASS</th>
<th>NYHA FUNCTIONAL CLASSIFICATION</th>
<th>CCS FUNCTIONAL CLASSIFICATION</th>
<th>SPECIFIC ACTIVITY SCALE</th>
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<tbody>
<tr>
<td>I</td>
<td>Patients with cardiac disease but without resulting limitations of physical activity. Ordinary physical activity does not cause undue fatigue, palpitation, dyspnea, or anginal pain.</td>
<td>Ordinary physical activity, such as walking and climbing stairs, does not cause angina. Angina occurs with strenuous or rapid or prolonged exertion at work or recreation.</td>
<td>Patients can perform complete any activity requiring &gt;7 metabolic equivalents (METs), e.g., can carry 24-night steps; carry objects that weigh 10 lb, do outdoor work (shovels snow, spade soil), do recreational activities (skiing, basketball, squash, handball, jog/walk 5 mph).</td>
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<tr>
<td>II</td>
<td>Patients with cardiac disease resulting in slight limitation of physical activity. They are comfortable at rest. Ordinary physical activity results in fatigue, palpitation, dyspnea, or anginal pain.</td>
<td>Slight limitation of ordinary activity. Walking or climbing stairs rapidly, walking up hill, walking or stand climbing after meals, in cold, in wind, or when under emotional stress, or only during the few hours after awakening. Walking more than two blocks on the level and climbing more than one flight of ordinary stairs at a normal pace and in normal conditions.</td>
<td>Patients can perform complete any activity requiring &gt;3 METs (e.g., sexual intercourse without stoppings, 10-min garden, rate, weave, roller skate, dance tennis, swim 1-2 mph, bowl, play golf).</td>
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<tr>
<td>III</td>
<td>Patients with cardiac disease resulting in marked limitation of physical activity. They are comfortable at rest. Less than ordinary physical activity causes fatigue, palpitation, dyspnea, or anginal pain.</td>
<td>Marked limitation of ordinary physical activity. Walking one to two blocks on the level and climbing more than one flight in normal conditions.</td>
<td>Patients can perform complete any activity requiring &gt;2 METs (e.g., shower without stoppings, strip and make bed, clean windows, walk 2.5 mph, bowl, play golf).</td>
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<tr>
<td>IV</td>
<td>Patients with cardiac disease resulting in inability to carry on any physical activity without discomfort.</td>
<td>Inability to carry on any physical activity without discomfort — anginal syndrome may be present at rest.</td>
<td>Patients cannot or do not perform to complete any activities requiring &gt;2 METs. Can carry out activities listed above (Specific Activity Scale, Class II).</td>
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NYHA – New York Heart Association

Pinakaimportant daw ung sa NYHA, kaya un na lang basahin natin. (see next page)

Gusto nya wag nyo na rin i-print 'tong page na to.
Pero if sinisipag kayo, sige go basahin nyo na rin for additional info 😊
So ito na lang ang aralin natin. **NYHA FUNCTIONAL CLASSIFICATION**

I. No limitations in doing physical activity
II. Ordinary physical activity
III. Less than ordinary physical activity (brushing their teeth)
IV. At rest

**LAST SLIDE NA!**

**RECAP** (Recapitulate pala meaning nun? Haha)

- Pathophysiology mechanisms of dyspnea
- Patterns of dyspnea
- Cardiac vs. Pulmonary
- Good history and physical examination is important
- Ancillary tests may be helpful
- Treat the patient, NOT just the symptom

*“The good physician treats the disease... The great physician treats the patient who has the disease.”*  
**Sir William Osler**