Preconference Form

Student name : **MaKenna Miska**
Medical Diagnosis/Disease: **COPD**

NCLEX IV *(8)*: **Physiological Integrity/Physiological Adaptation**

Anatomy and Physiology
Normal Structures

- The respiratory system is responsible for bringing oxygen into the body and removing carbon dioxide. It involves a series of structures that work together to facilitate breathing and gas exchange, ensuring that oxygen reaches the bloodstream and carbon dioxide is expelled.

Structures:

- Nasal Cavity (Nose and Nasal Passages):

* Air enters the body through the nose or mouth. The nasal cavity filters, warms, and humidifies the air using tiny hairs (cilia) and mucus.
* **Function:** The cilia trap dust, allergens, and pathogens, while the mucus keeps the air moist, making it more suitable for the lungs.

- Pharynx (Throat):

The pharynx is a muscular tube that serves as a pathway for both air (to the larynx) and food (to the esophagus).
Function: It directs the inhaled air from the nasal cavity or mouth to the larynx.

-Larynx (Voice Box):

Located below the pharynx, the larynx contains the vocal cords and is responsible for producing sound.
Function: It serves as a passageway for air and prevents food or liquids from entering the trachea through a flap called the epiglottis.

-Trachea (Windpipe):

The trachea is a tube that connects the larynx to the bronchi. It is lined with cilia and mucus to further filter the air.
- The trachea divides into the right and left mainstem bronchi at the carina, located at the 4th and 5th thoracic vertebrae.

Pathophysiology of Disease

-COPD, or chronic obstructive pulmonary disease, is a progressive lung disease characterized by persistent respiratory symptoms and airflow limitation. The disease mainly includes two conditions: chronic bronchitis and emphysema.

Airway Inflammation and Narrowing:

*Chronic exposure to irritants (like cigarette smoke or pollutants) causes inflammation in the airways. This inflammation triggers the release of inflammatory cells (like neutrophils and macrophages) and mediators (like cytokines), which cause structural changes and thickening of the airway walls.
*Over time, the airways become narrower, leading to obstruction and difficulty moving air in and out of the lungs.

-Mucus Overproduction

*The inflamed airways produce excess mucus. This mucus can clog the airways, making breathing even harder and promoting infection.

-Alveolar Damage in Emphysema:

*In emphysema, the alveoli (small air sacs in the lungs) lose their elasticity due to damage to the walls and supporting tissue. This prevents them from fully collapsing during exhalation, trapping air in the lungs and causing over-inflation. As a result, the lungs lose their efficiency in gas exchange.

-Air Trapping and Hyperinflation:

*Due to the loss of alveolar elasticity and airway narrowing, air becomes trapped in the lungs, leading to hyperinflation. This makes breathing harder and reduces lung capacity.

Impaired Gas Exchange:

*The destruction of alveoli and airflow limitation reduce the surface area

NCLEX IV *(7)*: **Reduction of Risk**

Anticipated Diagnostics
Labs

-ABGs to assess abnormal oxygenation (o2, co2, ph levels in blood)
-CBC: may reveal elevated hemoglobin/hematocrit
-BMP
- Sputum Culture and Sensitivity

Additional Diagnostics
- Pulmonary Function Tests (PFTs):
Spirometry: Measures lung function, especially forced expiratory volume in one second (FEV1) and forced vital capacity (FVC). COPD typically shows a reduced FEV1/FVC ratio.
Lung Volumes and Diffusion Capacity: Assess air trapping and gas exchange ability.
Chest X-ray or CT Scan: Checks for signs of lung hyperinflation, flattened diaphragm, or other changes characteristic of COPD.
Helps rule out other lung conditions like pneumonia or lung cancer.
Electrocardiogram (ECG): Detects signs of right-sided heart strain or failure due to chronic hypoxia and pulmonary hypertension.

Function: It serves as the main airway, transporting air to the bronchi.

-Bronchi and Bronchioles:

The trachea divides into the left and right bronchi, which lead to each lung. The bronchi further branch into smaller tubes called bronchioles.

-The mainstem bronchioles subdivide to form the lobar, segmental and subsegmental bronchi.

Function: The bronchi distribute air into the lungs, while the bronchioles regulate the flow of air and lead to the alveoli.

-They are encircled by smooth muscles that constrict and dilate.

-Lungs:

The lungs are two large, spongy organs that fill most of the chest cavity. The right lung has three lobes, and the left lung has two (to make room for the heart).

Function: The lungs house the alveoli, where gas exchange occurs.

-Alveoli:

Tiny, balloon-like air sacs at the end of the bronchioles, surrounded by capillaries.

Function: Alveoli are the primary sites for gas exchange. Oxygen diffuses from the alveoli into the capillaries, while carbon dioxide diffuses from the blood into the alveoli to be exhaled.

-Diaphragm:

A dome-shaped muscle located below the lungs that separates the chest cavity from the abdominal cavity.

Function: The diaphragm plays a crucial role in breathing by contracting and relaxing to change the pressure in the chest cavity, which allows air to move in and out of the lungs.

-Breathing:

Inhalation (Inspiration):

The diaphragm contracts and moves downward, while the intercostal muscles (muscles between the ribs) contract and lift the rib cage. This expands the chest

available for oxygen and carbon dioxide exchange, leading to low oxygen levels (hypoxemia) and sometimes high carbon dioxide levels (hypercapnia).

Chronic Hypoxia and Complications:

*Persistent low oxygen levels lead to increased red blood cell production, causing thicker blood (polycythemia). Chronic hypoxia can also cause pulmonary hypertension, which puts strain on the right side of the heart, potentially leading to right-sided heart failure.

-Chest hyperextends and becomes barrel shaped due to the respiratory muscles not being able to function correctly.

cavity.

Air Passage through the Upper Airway:
Air travels through the nasal cavity, where it is filtered and warmed, then moves down the pharynx and larynx. The epiglottis ensures that air moves into the trachea and not into the esophagus.

-Air Passage through the Lower Airway:
Air moves down the trachea into the bronchi, then through the bronchioles, and finally reaches the alveoli.

-Gas Exchange in the Alveoli:
At the alveoli, oxygen from the inhaled air passes through the thin walls of the alveoli and into the surrounding capillaries (small blood vessels).

Oxygen Transport:
Oxygen binds to hemoglobin in red blood cells and is carried throughout the body.

Carbon Dioxide Removal:
Carbon dioxide, a waste product from cells, diffuses from the capillaries into the alveoli to be expelled during exhalation.

Exhalation (Expiration):
The diaphragm relaxes and moves upward, while the intercostal muscles relax, causing the chest cavity to decrease in size.

NCLEX II *(3)*: **Health Promotion and Maintenance**

NCLEX IV *(7)*: **Reduction of Risk**

Contributing Risk Factors	Signs and Symptoms	Possible Therapeutic Procedures	Prevention of Complications
Smoking: The primary risk factor for COPD, as cigarette smoke causes chronic inflammation and damage to the airways and alveoli. Long-term	**Shortness of Breath (Dyspnea):** Often initially noticed during physical activity and progressively occurring at rest as the	Non-surgical -**Bronchodilator Therapy** **-Inhaled Corticosteroids** -**Oxygen Therapy** **-Pulmonary**	(What are some potential complications associated with this disease process) **Respiratory Infections:** Increased susceptibility to

exposure to smoke from cigarettes, cigars, or pipes significantly increases the risk.

Occupational Exposures:
Long-term exposure to dust, fumes, and chemicals (such as those in industrial or construction settings) can damage lung tissue and increase COPD risk.

Air Pollution:
Regular exposure to outdoor air pollution and indoor pollutants, like smoke from biomass fuels (wood, coal), particularly in poorly ventilated areas, can lead to chronic lung irritation.

Genetic Factors:
Alpha-1 Antitrypsin Deficiency: A rare genetic disorder that causes early onset of emphysema due to low levels of alpha-1 antitrypsin, a protective protein for the lungs.

Age:
COPD is more common in people over 40, likely due to prolonged exposure to environmental risks over time.

Respiratory Infections:
Frequent childhood respiratory infections can impair lung development and increase susceptibility to COPD in adulthood.

Asthma:
Having asthma, especially if poorly managed, may contribute to airway remodeling and long-term lung changes that increase the risk of developing COPD.

disease advances.

Chronic Cough:
A persistent cough, which may produce mucus (phlegm) that is often thick and may be clear, white, yellow, or green.

Increased Sputum Production:
Mucus overproduction is common, leading to frequent coughing and difficulty clearing the airways.

Wheezing:
A whistling sound heard during breathing, especially on exhalation, due to narrowed airways.

Chest Tightness:
A sensation of pressure or heaviness in the chest, often accompanying dyspnea and wheezing.

Frequent Respiratory Infections:
COPD patients are more prone to bronchitis, pneumonia, and other respiratory infections that can exacerbate symptoms.

Advanced Symptoms (as the disease progresses):

Fatigue:
Low energy levels and increased tiredness due to the body working harder to breathe.

Unintentional Weight Loss:
In advanced stages, some individuals experience weight loss due to increased metabolic demand and difficulty eating.

Cyanosis:
Bluish discoloration of

Rehabilitation
-Antibiotics
-Positive Expiratory Pressure (PEP) Devices
-Smoking Cessation Programs
-Nutritional Support

<u>Surgical</u>

- Lung Volume Reduction Surgery (LVRS) remove size of the lung by removing the diseased tissue.

-Bullectomy 1 or more bullae are removed to decrease WOB

-Lung Transplant
Reserved for patients with end-stage COPD who no longer respond to other therapies. A transplant can significantly improve quality of life but requires lifelong immunosuppressive therapy.

pneumonia and bronchitis due to mucus retention and airway obstruction.

Exacerbations:
Acute worsening of respiratory symptoms, often requiring hospitalization.

Pulmonary Hypertension:
Increased blood pressure in the pulmonary arteries, which can lead to right-sided heart failure

Right-Sided Heart Failure (Cor Pulmonale):
Occurs due to increased workload on the right side of the heart from chronic hypoxia and pulmonary hypertension.

Pneumothorax:
A collapsed lung, more common in emphysema patients due to weakened alveoli.

Osteoporosis:
Increased risk of bone density loss, especially in patients on long-term corticosteroids.

Anxiety and Depression:
Common mental health issues in COPD patients due to chronic illness.

Malnutrition:
Weight loss and muscle wasting due to increased energy expenditure from labored breathing.

	the lips or nail beds, indicating low oxygen levels in the blood. **Barrel Chest:** Due to chronic air trapping and lung hyperinflation, some patients develop an increased anterior-posterior chest diameter.		

NCLEX IV *(6)*: **Pharmacological and Parenteral Therapies**

Anticipated Medication Management

Bronchodilators:
Short-Acting Beta-2 Agonists (SABAs):
Examples: Albuterol, Levalbuterol.
Used for quick relief of acute symptoms (rescue inhalers).
Long-Acting Beta-2 Agonists (LABAs):
Examples: Salmeterol, Formoterol.
Used for maintenance therapy to improve lung function and reduce symptoms.
Anticholinergics:
Short-Acting: Ipratropium bromide.
Long-Acting: Tiotropium, Aclidinium.
Help relax airway muscles and reduce mucus production.
Inhaled Corticosteroids (ICS):
Examples: Fluticasone, Budesonide, Beclomethasone.
Used to reduce airway inflammation and prevent exacerbations, often in combination with bronchodilators.
Combination Inhalers:
LABA/ICS Combinations: Examples include Advair (Salmeterol/Fluticasone), Symbicort (Formoterol/Budesonide).
Provide the benefits of both

NCLEX IV *(5)*: **Basic Care and Comfort**

Non-Pharmacologic Care Measures

Pulmonary Rehabilitation:
A structured program that includes exercise training, education about the disease, nutritional support, and psychological counseling, aimed at improving physical fitness and overall well-being.
Breathing Techniques:
Pursed-Lip Breathing: Helps slow down breathing and keeps airways open longer, making it easier to exhale.
Diaphragmatic Breathing:
Encourages deeper breaths using the diaphragm, improving lung expansion and oxygenation.
Nutritional Support:
A balanced diet that includes adequate calories and nutrients to maintain energy levels, prevent weight loss, and support overall health.
Smoking Cessation:
Essential for all smokers with COPD; programs may include counseling, support groups, and access to cessation aids (like nicotine

NCLEX III *(4)*: **Psychosocial/Holistic Care Needs**

What stressors might a patient with this diagnosis be experiencing?

-Fear & anxiety
-Financial
-Isolation
-Chronic pain/discomfort
-Physical limitations
-Emotional burden
-Uncertain about the future
-Relationship impact
-Lifestyle changes

bronchodilation and anti-inflammatory effects.
Phosphodiesterase-4 Inhibitors:
Example: Roflumilast.
Used for patients with severe COPD to reduce inflammation and prevent exacerbations, particularly in those with chronic bronchitis.
Oxygen Therapy:
Supplemental oxygen may be prescribed for patients with low blood oxygen levels (hypoxemia) to maintain adequate oxygen saturation.
Antibiotics:
Prescribed during acute exacerbations when there is a suspected bacterial infection (e.g., increased sputum production or change in sputum color).
Mucolytics:
Example: Acetylcysteine.
Used to help thin and loosen mucus in the airways, making it easier to cough up.
Systemic Corticosteroids:
Used for short periods during exacerbations to reduce inflammation and improve symptoms.

replacement therapy).
Physical Activity:
Encouragement of regular, moderate exercise (as tolerated), which can help improve lung function, strength, and endurance.
Oxygen Therapy:
If prescribed, using supplemental oxygen at home or during activities to maintain adequate oxygen saturation levels.
Hydration:
Encouraging adequate fluid intake to help thin mucus secretions, making it easier to clear the airways.

Vaccinations:
Ensuring patients receive the annual flu vaccine and pneumococcal vaccine to reduce the risk of respiratory infections.

Client/Family Education

List 3 potential teaching topics/areas

- **Disease management/ self-care**
- **Breathing techniques and exercise**
- **Nutritional support/lifestyle changes**

NCLEX I *(1)*: Safe and Effective Care Environment

Multidisciplinary Team Involvement
(Which other disciplines do you expect to share in the care of this patient)

-Nurse
-Respiratory therapist
-Nutritionist
-Social worker
-Spiritual
-Pulmonologist
-PT
-OT
