

## HEMOTHORAX/PNEUMOTHORAX

The lung may collapse partially or completely because of air (pneumothorax), blood (hemothorax), or other fluid (pleural effusion) collecting in the pleural/potential space. The intrathoracic pressure changes induced by increased pleural space volumes reduce lung capacity, causing respiratory distress and gas exchange problems and producing tension on mediastinal structures that can impede cardiac and systemic circulation. Pneumothorax may be traumatic (open or closed) or spontaneous.

### CARE SETTING

Inpatient medical or surgical unit.

### RELATED CONCERNS

Cardiac surgery: postoperative care

Chronic obstructive pulmonary disease (COPD) and asthma

Psychosocial aspects of care

Pulmonary tuberculosis (TB)

Ventilatory assistance (mechanical)

## Patient Assessment Database

Findings vary, depending on the amount of air and/or fluid accumulation, rate of accumulation, and underlying lung function.

### ACTIVITY/REST

**May report:** Dyspnea with activity or even at rest

### CIRCULATION

**May exhibit:** Tachycardia; irregular rate/dysrhythmias  
S<sub>3</sub> or S<sub>4</sub>/gallop heart rhythm (heart failure secondary to effusion)  
Apical pulse reveals point of maximal impulse (PMI) displaced in presence of mediastinal shift (with tension pneumothorax)  
Hamman's sign (crunching sound correlating with heartbeat, reflecting air in mediastinum)  
BP: Hypertension/hypotension  
JVD

### EGO INTEGRITY

**May exhibit:** Apprehension, irritability

### FOOD/FLUID

**May exhibit:** Recent placement of central venous IV/pressure line (causative factor)

### PAIN/DISCOMFORT

**May report (depending on the size/area involved):** Unilateral chest pain, aggravated by breathing, coughing, and movement  
Sudden onset of symptoms while coughing or straining (spontaneous pneumothorax)  
Sharp, stabbing pain aggravated by deep breathing, possibly radiating to neck, shoulders, abdomen (pleural effusion)

**May exhibit:** Guarding affected area  
Distraction behaviors  
Facial grimacing

### RESPIRATION

**May report:** Difficulty breathing, "air hunger"  
Coughing (may be presenting symptom)

History of recent chest surgery/trauma; chronic lung disease, lung inflammation/infection (empyema/ effusion); diffuse interstitial disease (sarcoidosis); malignancies (e.g., obstructive tumor)

Previous spontaneous pneumothorax; spontaneous rupture of emphysematous bulla, subpleural bleb (COPD)

**May exhibit:** Respirations: Rate increased/tachypnea  
 Increased work of breathing, use of accessory muscles in chest, neck; intercostal retractions, forced abdominal expiration  
 Breath sounds decreased or absent (involved side)  
 Fremitus decreased (involved site)  
 Chest percussion: Hyperresonance over air-filled area (pneumothorax); dullness over fluid-filled area (hemothorax)  
 Chest observation and palpation: Unequal (paradoxical) chest movement (if trauma, flail); reduced thoracic excursion (affected side)  
 Skin: Pallor, cyanosis, diaphoresis, subcutaneous crepitation (air in tissues on palpation)  
 Mentation: Anxiety, restlessness, confusion, stupor  
 Use of positive pressure mechanical ventilation/positive end-expiratory pressure (PEEP) therapy

## SAFETY

**May report:** Recent chest trauma (e.g., fractured ribs, penetrating wound)  
 Radiation/chemotherapy for malignancy  
 Presence of central IV line

## TEACHING/LEARNING

**May report:** History of familial risk factors: Tuberculosis, cancer  
 Recent intrathoracic surgery/lung biopsy  
 Evidence of failure to improve

**Discharge plan considerations:** **DRG projected length of inpatient stay: 6.5 days**  
 Temporary assistance with self-care, homemaker/maintenance tasks  
**Refer to section at end of plan for postdischarge considerations.**

## DIAGNOSTIC STUDIES

**Thoracic CT:** Studies show that CT is more sensitive than x-ray in detecting thoracic injuries, lung contusion, hemothorax, and pneumothorax. Early CT may influence therapeutic management.

**Chest x-ray:** Reveals air and/or fluid accumulation in the pleural space; may show shift of mediastinal structures (heart).

**ABGs:** Variable depending on degree of compromised lung function, altered breathing mechanics, and ability to compensate. PaCO<sub>2</sub> occasionally elevated. PaO<sub>2</sub> may be normal or decreased; oxygen saturation usually decreased.

**Thoracentesis:** Presence of blood/serosanguineous fluid indicates hemothorax.

**Hb:** May be decreased, indicating blood loss.

## NURSING PRIORITIES

1. Promote/maintain lung re-expansion for adequate oxygenation/ventilation.
2. Minimize/prevent complications.
3. Reduce discomfort/pain.
4. Provide information about disease process, treatment regimen, and prognosis.

## DISCHARGE GOALS

1. Adequate ventilation/oxygenation maintained.
2. Complications prevented/resolved.
3. Pain absent/controlled.
4. Disease process/prognosis and therapy needs understood.
5. Plan in place to meet needs after discharge.

**NURSING DIAGNOSIS: Breathing Pattern, ineffective**

**May be related to**

Decreased lung expansion (air/fluid accumulation)

Musculoskeletal impairment

Pain/anxiety

Inflammatory process

**Possibly evidenced by**

Dyspnea, tachypnea

Changes in depth/equality of respirations; altered chest excursion

Use of accessory muscles, nasal flaring

Cyanosis, abnormal ABGs

**DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:**

**Respiratory Status: Ventilation (NOC)**

Establish a normal/effective respiratory pattern with ABGs within patient's normal range.

Be free of cyanosis and other signs/symptoms of hypoxia.

ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Respiratory Monitoring (NIC)</b></p> <p><b>Independent</b></p> <p>Identify etiology/precipitating factors, e.g., spontaneous collapse, trauma, malignancy, infection, complication of mechanical ventilation.</p> <p>Evaluate respiratory function, noting rapid/shallow respirations, dyspnea, reports of "air hunger," development of cyanosis, changes in vital signs.</p> <p>Monitor for synchronous respiratory pattern when using mechanical ventilator. Note changes in airway pressures.</p> <p>Auscultate breath sounds.</p> <p>Note chest excursion and position of trachea.</p> <p>Assess fremitus.</p>	<p>Understanding the cause of lung collapse is necessary for proper chest tube placement and choice of other therapeutic measures.</p> <p>Respiratory distress and changes in vital signs may occur as a result of physiological stress and pain or may indicate development of shock due to hypoxia/hemorrhage.</p> <p>Difficulty breathing "with" ventilator and/or increasing airway pressures suggests worsening of condition/development of complications (e.g., spontaneous rupture of a bleb creating a new pneumothorax).</p> <p>Breath sounds may be diminished or absent in a lobe, lung segment, or entire lung field (unilateral). Atelectatic area will have no breath sounds, and partially collapsed areas have decreased sounds. Regularly scheduled evaluation also helps determine areas of good air exchange and provides a baseline to evaluate resolution of pneumothorax.</p> <p>Chest excursion is unequal until lung re-expands. Trachea deviates away from affected side with tension pneumothorax.</p> <p>Voice and tactile fremitus (vibration) is reduced in fluid-filled/consolidated tissue.</p>

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ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Respiratory Monitoring (NIC)</b></p> <p><b>Independent</b></p> <p>Assist patient with splinting painful area when coughing, deep breathing.</p> <p>Maintain position of comfort, usually with head of bed elevated. Turn to affected side. Encourage patient to sit up as much as possible.</p> <p>Maintain a calm attitude, assisting patient to “take control” by using slower/deeper respirations.</p> <p><b>Tube Care: Chest (NIC)</b></p> <p>Once chest tube is inserted: Check suction control chamber for correct amount of suction (determined by water level, wall/table regulator at correct setting;</p> <p style="padding-left: 40px;">Check fluid level in water-seal chamber; maintain at prescribed level;</p> <p style="padding-left: 40px;">Observe water-seal chamber bubbling;</p> <p style="padding-left: 40px;">Evaluate for abnormal/continuous water-seal chamber bubbling;</p> <p style="padding-left: 40px;">Determine location of air leak (patient- or system-centered) by clamping thoracic catheter just distal to exit from chest;</p> <p style="padding-left: 40px;">Place petrolatum gauze and/or other appropriate material around the insertion as indicated.</p>	<p>Supporting chest and abdominal muscles makes coughing more effective/less traumatic.</p> <p>Promotes maximal inspiration; enhances lung expansion and ventilation in unaffected side.</p> <p>Assists patient to deal with the physiological effects of hypoxia, which may be manifested as anxiety and/or fear.</p> <p>Maintains prescribed intrapleural negativity, which promotes optimum lung expansion and/or fluid drainage. <i>Note:</i> Dry-seal setups are also used with an automatic control valve (AVC), which provides a one-way valve seal similar to that achieved with the water-seal system.</p> <p>Water in a sealed chamber serves as a barrier that prevents atmospheric air from entering the pleural space should the suction source be disconnected and aids in evaluating whether the chest drainage system is functioning appropriately. <i>Note:</i> Underfilling the water-seal chamber leaves it exposed to air, putting patient at risk for pneumothorax or tension pneumothorax. Overfilling (a more common mistake) prevents air from easily exiting the pleural space, thus preventing resolution of pneumothorax or tension pneumothorax.</p> <p>Bubbling during expiration reflects venting of pneumothorax (desired action). Bubbling usually decreases as the lung expands or may occur only during expiration or coughing as the pleural space diminishes. Absence of bubbling may indicate complete lung re-expansion (normal) or represent complications, e.g., obstruction in the tube.</p> <p>With suction applied, this indicates a persistent air leak that may be from a large pneumothorax at the chest insertion site (patient-centered) or chest drainage unit (system-centered).</p> <p>If bubbling stops when catheter is clamped at insertion site, leak is patient-centered (at insertion site or within the patient).</p> <p>Usually corrects insertion site air leak.</p>

ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Tube Care: Chest (NIC)</b></p> <p><b>Independent</b></p> <p>Clamp tubing in stepwise fashion downward toward drainage unit if air leak continues;</p> <p>Seal drainage tubing connection sites securely with lengthwise tape or bands according to established policy;</p> <p>Monitor water-seal chamber “tidaling.” Note whether change is transient or permanent;</p> <p>Position drainage system tubing for optimal function, e.g., shorten tubing/coil extra tubing on bed, making sure tubing is not kinked or hanging below entrance to drainage container. Drain accumulated fluid as necessary;</p> <p>Evaluate character/amount of chest tube drainage, noting whether tube is warm and full of blood and bloody fluid level in water-seal bottle is rising;</p> <p>Evaluate need for tube stripping (“milking”);</p> <p>Strip tubes carefully per protocol, in a manner that minimizes excess negative pressure.</p> <p>If thoracic catheter is disconnected/dislodged: Observe for signs of respiratory distress. If possible, reconnect thoracic catheter to tubing/suction, using clean technique. If the catheter is dislodged from the chest, cover insertion site immediately with petrolatum dressing and apply firm pressure. Notify physician at once.</p>	<p>Isolates location of a system-centered air leak. <i>Note:</i> Information indicates that clamping for a suspected leak may be the only time that chest tube should be clamped.</p> <p>Prevents/corrects air leaks at connector sites.</p> <p>The water-seal chamber serves as an intrapleural manometer (gauges intrapleural pressure); therefore, fluctuation (tidaling) reflects pressure differences between inspiration and expiration. Tidaling of 2–6 cm during inspiration is normal and may increase briefly during coughing episodes. Continuation of excessive tidal fluctuations may indicate existence of airway obstruction or presence of a large pneumothorax.</p> <p>Improper position, kinking, or accumulation of clots/fluid in the tubing changes the desired negative pressure and impedes air/fluid evacuation. <i>Note:</i> If a dependent loop in the drainage tube cannot be avoided, lifting and draining it every 15 min will maintain adequate drainage in the presence of a hemothorax.</p> <p>Useful in evaluating resolution of pneumothorax/development of hemorrhage requiring prompt intervention. <i>Note:</i> Some drainage systems are equipped with an autotransfusion device, which allows for salvage of shed blood.</p> <p>Although routine stripping is not recommended, it may be necessary occasionally to maintain drainage in the presence of fresh bleeding/large blood clots or purulent exudate (empyema).</p> <p>Stripping is usually uncomfortable for patient because of the change in intrathoracic pressure, which may induce coughing or chest discomfort. Vigorous stripping can create very high intrathoracic suction pressure, which can be injurious (e.g., invagination of tissue into catheter eyelets, collapse of tissues around the catheter, and/or bleeding from rupture of small blood vessels).</p> <p>Pneumothorax may recur, requiring prompt intervention to prevent fatal pulmonary and circulatory impairment.</p>

<p><b>ACTIONS/INTERVENTIONS</b></p> <p><b>Tube Care: Chest (NIC)</b></p> <p><b>Independent</b></p> <p>After thoracic catheter is removed:  Cover insertion site with sterile occlusive dressing. Observe for signs/symptoms that may indicate recurrence of pneumothorax, e.g., shortness of breath, reports of pain. Inspect insertion site, note character of drainage.</p> <p><b>Respiratory Monitoring (NIC)</b></p> <p><b>Collaborative</b></p> <p>Review serial chest x-rays.</p> <p>Monitor/graph serial ABGs and pulse oximetry. Review vital capacity/tidal volume measurements.</p> <p>Administer supplemental oxygen via cannula/mask/mechanical ventilation as indicated.</p>	<p><b>RATIONALE</b></p> <p>Early detection of a developing complication is essential, e.g., recurrence of pneumothorax, presence of infection.</p> <p>Monitors progress of resolving hemothorax/pneumothorax and re-expansion of lung. Can identify malposition of endotracheal tube (ET) affecting lung re-expansion.</p> <p>Assesses status of gas exchange and ventilation, need for continuation or alterations in therapy.</p> <p>Aids in reducing work of breathing; promotes relief of respiratory distress and cyanosis associated with hypoxemia.</p>

<p><b>NURSING DIAGNOSIS: Trauma/Suffocation, risk for</b></p> <p><b>Risk factors may include</b></p> <p>Concurrent disease/injury process  Dependence on external device (chest drainage system)  Lack of safety education/precautions</p> <p><b>Possibly evidenced by</b></p> <p>[Not applicable; presence of signs and symptoms establishes an <i>actual</i> diagnosis.]</p> <p><b>DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:</b></p> <p><b>Risk Control (NOC)</b></p> <p>Recognize need for/seek assistance to prevent complications.</p> <p><b>CAREGIVER WILL:</b></p> <p>Correct/avoid environmental and physical hazards.</p>
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ACTIONS/INTERVENTIONS	RATIONALE
<p><b>Teaching: Procedure/Treatment (NIC)</b></p> <p><b>Independent</b></p> <p>Review with patient purpose/function of chest drainage unit, taking note of safety features.</p> <p>Instruct patient to refrain from lying/pulling on tubing.</p> <p>Identify changes/situations that should be reported to caregivers, e.g., change in sound of bubbling, sudden “air hunger” and chest pain, disconnection of equipment.</p> <p><b>Tube Care (NIC)</b></p> <p>Anchor thoracic catheter to chest wall and provide extra length of tubing before turning or moving patient;</p> <p>Secure tubing connection sites; Pad banding sites with gauze/tape.</p> <p>Secure drainage unit to patient’s bed or on stand/cart placed in low-traffic area.</p> <p>Provide safe transportation if patient is sent off unit for diagnostic purposes. Before transporting: check water-seal chamber for correct fluid level, presence/absence of bubbling; presence/degree/timing of tidaling. Ascertain whether or not chest tube can be clamped or disconnected from suction source.</p> <p>Monitor thoracic insertion site, noting condition of skin, presence/characteristics of drainage from around the catheter. Change/reapply sterile occlusive dressing as needed.</p> <p>Observe for signs of respiratory distress if thoracic catheter is disconnected/dislodged. (Refer to ND: Breathing Pattern, ineffective</p>	<p>Information on how system works provides reassurance, reducing patient anxiety.</p> <p>Reduces risk of obstructing drainage/inadvertently disconnecting tubing.</p> <p>Timely intervention may prevent serious complications.</p> <p>Prevents thoracic catheter dislodgment or tubing disconnection and reduces pain/discomfort associated with pulling or jarring of tubing. Prevents tubing disconnection. Protects skin from irritation/pressure.</p> <p>Maintains upright position and reduces risk of accidental tipping/breaking of unit.</p> <p>Promotes continuation of optimal evacuation of fluid/air during transport. If patient is draining large amounts of chest fluid or air, tube should not be clamped or suction interrupted because of risk of reaccumulation of fluid/air, compromising respiratory status.</p> <p>Provides for early recognition and treatment of developing skin/tissue erosion or infection.</p> <p>Pneumothorax may recur/worsen, compromising respiratory function and requiring emergency intervention.</p>

**NURSING DIAGNOSIS: Knowledge, deficient [Learning Need] regarding condition, treatment regimen, self-care, and discharge needs**

**May be related to**

Lack of exposure to information

**Possibly evidenced by**

Expressions of concern, request for information

Recurrence of problem

**DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:**

**Knowledge: Disease Process (NOC)**

Verbalize understanding of cause of problem (when known).

Identify signs/symptoms requiring medical follow-up.

**Knowledge: Treatment Regimen (NOC)**

Follow therapeutic regimen and demonstrate lifestyle changes if necessary to prevent recurrence.

ACTIONS/INTERVENTIONS	RATIONALE
<b>Teaching: Disease Process (NIC)</b>	
<b>Independent</b>	
Review pathology of individual problem.	Information reduces fear of unknown. Provides knowledge base for understanding underlying dynamics of condition and significance of therapeutic interventions.
Identify likelihood for recurrence/long-term complications.	Certain underlying lung diseases such as severe COPD and malignancies may increase incidence of recurrence. In otherwise healthy patients who suffered a spontaneous pneumothorax, incidence of recurrence is 10%–50%. Those who have a second spontaneous episode are at high risk for a third incident (60%).
Review signs/symptoms requiring immediate medical evaluation, e.g., sudden chest pain, dyspnea/air hunger, progressive respiratory distress.	Recurrence of pneumothorax/hemothorax requires medical intervention to prevent/reduce potential complications.
Review significance of good health practices, e.g., adequate nutrition, rest, exercise.	Maintenance of general well-being promotes healing and may prevent/limit recurrences.

**POTENTIAL CONSIDERATIONS following acute hospitalization (dependent on patient's age, physical condition/presence of complications, personal resources, and life responsibilities)**

Infection, risk for—invasive procedure, traumatized tissue/broken skin, decreased ciliary action.

Breathing Pattern, ineffective—recurrence of condition, inflammatory process.