

DIANE'S NGN NCLEX 2026 • RESPIRATORY / CHEST TRAUMA

Hemothorax

Accumulation of blood in the pleural cavity that compresses the lung, impairs ventilation, and — when massive — produces both *obstructive shock* from lung/mediastinal compression and *hypovolemic shock* from blood loss.

SYSTEM: RESPIRATORY

CLUSTER: CHEST TRAUMA

▲ PRIORITY: ABC + HEMODYNAMICS

TEST PLAN: 2026 NGN

SOURCE TRANSPARENCY

Hemothorax is *not present* in the project's uploaded reference notes (which focus on blood transfusion, IV/central line care, oxygen therapy, radiation, chemotherapy, wound care, NG tubes, and medication administration). Content below is compiled from

SAUNDERS COMPREHENSIVE REVIEW FOR THE NCLEX-RN (2026 ED.)

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LIPPINCOTT ILLUSTRATED REVIEWS: PHARMACOLOGY

,

ATLS 10TH EDITION

(Advanced Trauma Life Support, American College of Surgeons),

EAST PRACTICE MANAGEMENT GUIDELINES FOR HEMOTHORAX

, and standard chest tube management protocols (AACN, INS).

SECTION 01

1 Definition & Overview



What It Is

Blood accumulates in the **pleural space** — the potential cavity between the parietal and visceral pleura — compressing the underlying lung.



Why It Matters

Causes **impaired ventilation** (lung collapse), **impaired oxygenation** (V/Q mismatch), and **blood loss** — a dual respiratory + circulatory emergency.



Most Common Cause

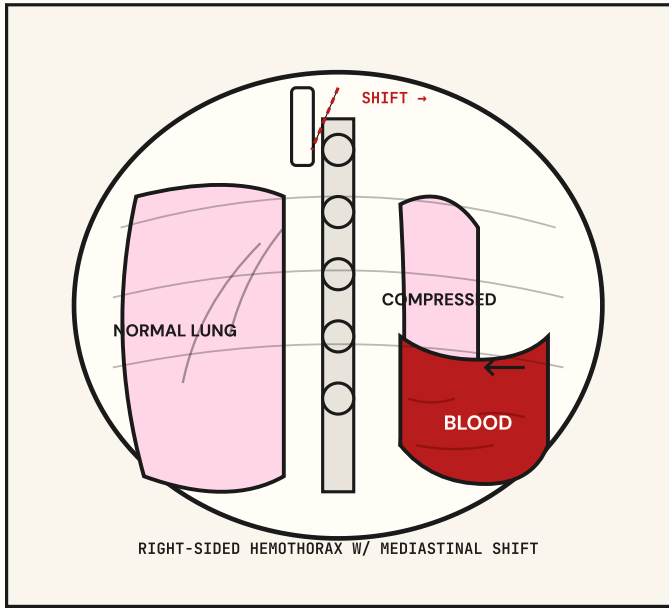
Blunt or penetrating chest trauma (MVC, falls, stab/gunshot wounds). Also: rib fractures, thoracic surgery, malignancy, PE, anticoagulant therapy, central line insertion (iatrogenic).

CLASSIFICATION	VOLUME IN PLEURAL SPACE	CLINICAL PICTURE	MANAGEMENT
SMALL	< 400 mL	Often asymptomatic; CXR shows costophrenic angle blunting	Observation; serial CXR; small-bore chest tube if expanding
MODERATE	400 – 1,000 mL	Dyspnea, ↓ breath sounds, dullness to percussion	Large-bore chest tube (32–40 Fr); IV access; type & crossmatch
MASSIVE 🚑	> 1,500 mL initial OR > 200 mL/hr × 2–4 hrs	Hypovolemic shock, tracheal deviation, severe respiratory distress	Emergent thoracotomy + blood product resuscitation + chest tube

SECTION 02

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Pathophysiology



- 1 **Vascular injury**
↓ Trauma tears intercostal arteries, internal mammary, pulmonary vessels, or great vessels.
- 2 **Blood fills pleural space**
↓ Negative intrapleural pressure pulls blood into the cavity (can hold 2–3 L per side).
- 3 **Lung compression**
↓ Lung collapses on the affected side → ↓ ventilation, atelectasis, V/Q mismatch.
- 4 **Hypoxemia**
↓ PaO_2 , ↓ SpO_2 → tissue hypoxia, anaerobic metabolism, lactic acidosis.
- 5 **Blood loss**
↓ Hemorrhage into pleural space → ↓ circulating volume → hypovolemic shock.
- 6 **Mediastinal shift (massive)**
Heart, great vessels, and trachea shift to unaffected side → ↓ venous return → obstructive shock → cardiac arrest if untreated.

SECTION 03



Signs & Symptoms

EARLY (Mild – Moderate)

COMPENSATION PHASE

- **Tachypnea** & shallow breathing
- **Tachycardia** (compensatory)
- Dyspnea / shortness of breath
- Sharp **pleuritic chest pain** on affected side
- Anxiety, restlessness (early hypoxia cue)
- ↓ **Breath sounds** on affected side
- **Dullness to percussion** over fluid
- ↓ tactile fremitus on affected side
- BP may still be normal (compensated)

LATE (Severe / Massive)

DECOMPENSATION PHASE

- **Hypotension** (hypovolemic shock)
- Weak, thready pulse
- Cool, clammy, pale, mottled skin
- **Cyanosis** (central — lips, mucosa)
- **Tracheal deviation** AWAY from affected side
- Distended neck veins (if tamponade-like physiology)
- ↓ LOC, confusion → unresponsive
- SpO₂ < 90% despite supplemental O₂
- Hypovolemic shock → cardiac arrest if untreated



RED-FLAG FINDINGS — Notify Provider STAT

- **> 1,500 mL** drainage immediately from chest tube → *massive hemothorax = thoracotomy*
- **> 200 mL/hr** chest tube drainage for 2–4 consecutive hours → *ongoing bleeding = surgical exploration*
- **Tracheal deviation** → mediastinal shift; impending cardiovascular collapse
- **SBP < 90 mmHg** + tachycardia + cool skin → hypovolemic shock
- **Sudden ↑ in bright red drainage** → fresh active hemorrhage
- **Absent breath sounds** + hypoxia + hemodynamic instability → emergency

SECTION 04 • ABC FRAMEWORK

4

Priority Nursing Interventions

A

Airway

- **Assess** patency; suction PRN
- Position **High-Fowler's** (or semi-Fowler if unstable) to ease ventilation
- Prepare for **intubation** if LOC declines or respiratory failure
- Keep airway equipment at bedside

B

Breathing

- **Administer high-flow O₂** (NRB 10–15 L/min initially); titrate to SpO₂ ≥ 94%
- Auscultate breath sounds q1–2h (compare bilaterally)
- **Assist with chest tube insertion** (32–40 Fr, 4th–5th intercostal space, mid-axillary)
- Monitor RR, depth, work of breathing, accessory muscle use
- Continuous SpO₂ + capnography
- Pulmonary toileting: **incentive spirometer, deep breathing, splinting**

C

Circulation

- **Two large-bore IVs** (16–18 gauge); type & crossmatch
- **IV fluids:** warm 0.9% NS or LR (avoid over-resuscitation pre-hemorrhage control)
- **Blood products:** PRBCs, FFP, platelets per massive transfusion protocol (1:1:1)
- Consider **autotransfusion** from chest tube collection chamber
- Continuous cardiac monitoring; VS q5–15 min until stable
- Strict I&O; insert urinary catheter (goal > 0.5 mL/kg/hr)

DIAGNOSTIC PRIORITIES

- **CXR** (upright if possible): blunting of costophrenic angle, opacification
- **FAST/E-FAST ultrasound** at bedside (fast, sensitive for trauma)
- **Chest CT** — gold standard for volume estimation
- **ABG:** ↓ PaO₂, ↑ PaCO₂ (late), respiratory or metabolic acidosis
- **CBC, type & crossmatch, coags** (PT/INR/aPTT), lactate

ONGOING MONITORING (Q1H MINIMUM)

- Chest tube output: amount, color, character
- Tidal volume in water-seal chamber (oscillation w/ respirations)
- Bubbling in water-seal chamber (should be ABSENT in pure hemothorax)
- Insertion site: dressing intact, occlusive, no crepitus
- VS, SpO₂, urine output, mental status
- Pain rating; reassess after intervention

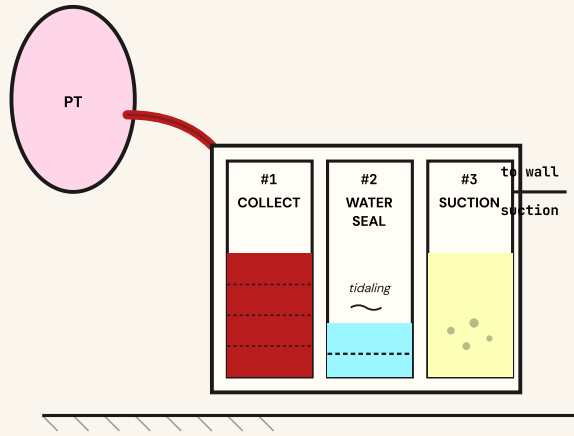
SECTION 05 • CORE SKILL

5

Chest Tube Management

3-CHAMBER DRAINAGE SYSTEM

KEEP BELOW PATIENT CHEST LEVEL



Critical Chest Tube Rules

- ✓ **Keep collection chamber BELOW chest level** at all times — gravity drainage; prevents backflow.
- ✓ **Tidaling** in water-seal chamber = normal (water rises with inspiration, falls with expiration). Loss of tidaling → tube occluded OR lung re-expanded.
- ! **Continuous bubbling in water seal = AIR LEAK** (concern for pneumothorax component, loose connection, or system fault). In pure hemothorax, bubbling should be ABSENT.
- ! **NEVER strip or milk** the tubing routinely (↑ intrapleural pressure → tissue damage).
- ! **NEVER clamp routinely** — can convert hemothorax to tension hemothorax. Clamp **ONLY** momentarily to change drainage unit or check for air leak per orders.
- ✓ **If tube dislodges from patient** → cover insertion site with sterile dry occlusive dressing, taped on **3 sides only** (creates one-way flutter valve); notify provider STAT.
- ✓ **If tube disconnects from drainage system** → submerge end in **sterile water**; replace system; notify provider.
- ✓ **Mark drainage level** on the collection chamber hourly initially; document amount + color (sanguineous → serosanguineous → serous).

SECTION 06

6 Pharmacology

DRUG / CLASS	MECHANISM	KEY SIDE EFFECTS	NURSING CONSIDERATIONS
Morphine / Fentanyl OPIOID ANALGESIC	Bind μ -opioid receptors → ↓ pain perception; ↓ pulmonary inflammation reflex	Respiratory depression, hypotension, sedation, constipation, urinary retention	Monitor RR, SpO ₂ , LOC; have naloxone at bedside; balance pain control vs respiratory drive
Tranexamic Acid (TXA) ANTIFIBRINOLYTIC	Blocks plasminogen activation → stabilizes clot; ↓ hemorrhage in trauma	Thrombosis, seizures, hypotension if rapid infusion, GI upset	Give within 3 hrs of injury ; 1 g IV over 10 min, then 1 g over 8 hrs; monitor for thrombotic events
PRBCs / FFP / Platelets BLOOD PRODUCTS	Restore O ₂ -carrying capacity, clotting factors, and platelet function	Transfusion reactions (febrile, allergic, hemolytic), circulatory overload, hypocalcemia (citrate), hyperkalemia	Two RNs verify; 0.9% NS only; baseline VS; stay first 15 min; monitor for low back pain, fever, hives, hypotension
Vitamin K / PCC / FFP ANTICOAG REVERSAL	Reverse warfarin (Vit K, PCC); replace clotting factors (FFP); idarucizumab for dabigatran; andexanet for factor Xa inhibitors	Thrombosis risk after reversal; allergic reactions	Indicated if hemothorax in patient on anticoagulants; check INR, aPTT ; resume anticoagulation only when bleeding controlled
Cefazolin 1st-GEN CEPHALOSPORIN	Cell wall synthesis inhibitor; prophylaxis against empyema after chest tube	Hypersensitivity (cross-rx with PCN in <1%), GI upset, C. diff with prolonged use	Assess for PCN allergy ; typically 24 hr post chest tube insertion per EAST guidelines (debated)
Lidocaine 1–2% LOCAL ANESTHETIC	Blocks Na ⁺ channels → blocks nerve conduction; used at chest tube insertion site	CNS toxicity (tinnitus, seizures), arrhythmias, methemoglobinemia (rare)	Max dose 4.5 mg/kg (plain) or 7 mg/kg (with epi); confirm allergies; aspirate before injecting
Norepinephrine VASOPRESSOR	α_1 agonist → vasoconstriction → ↑ MAP; used after volume resuscitation if persistent hypotension	Hypertension, arrhythmias, tissue ischemia/extravasation necrosis, reflex bradycardia	Give via central line preferred; titrate to MAP ≥ 65 mmHg; monitor extremities for perfusion

SECTION 07 • COMMON PITFALLS

7

NCLEX Test Traps

x WRONG THINKING

"Continuous bubbling in the water-seal chamber means the system is working."

✓ NCLEX RIGHT ANSWER

Continuous bubbling in the **water-seal** chamber = **air leak**. Bubbling in the **suction-control** chamber is expected. Pure hemothorax should have NO bubbling in water seal.

x WRONG THINKING

"Clamp the chest tube while transporting or if it disconnects."

✓ NCLEX RIGHT ANSWER

Never clamp routinely — risk of tension hemothorax/pneumothorax. If disconnected: submerge end in sterile water. If pulled out: 3-sided occlusive dressing, then notify provider.

x WRONG THINKING

"Tracheal deviation toward the affected side confirms massive hemothorax."

✓ NCLEX RIGHT ANSWER

Trachea deviates **AWAY** from the affected side (mediastinal contents pushed to the unaffected side by accumulating blood). Same direction as tension pneumothorax.

x WRONG THINKING

"BP is the first cue I should watch for shock in hemothorax."

✓ NCLEX RIGHT ANSWER

BP drops **LATE**. Earliest cues are **tachycardia, tachypnea, restlessness, anxiety, narrowing pulse pressure**. Waiting for hypotension = waiting too long.

x WRONG THINKING

"Strip or milk the chest tube every hour to keep clots out."

✓ NCLEX RIGHT ANSWER

Do NOT strip or milk routinely — causes harmful pressure spikes. Gently squeeze hand-over-hand only if specifically ordered for obvious clots.

x WRONG THINKING

"Position the patient flat to maximize lung expansion."

✓ NCLEX RIGHT ANSWER

High-Fowler's or semi-Fowler's position improves ventilation and promotes drainage by gravity. Lay flat **ONLY** if shock/spinal precautions require it.

x WRONG THINKING

"Hemothorax → start dopamine right away for the low BP."

✓ NCLEX RIGHT ANSWER

Treat **volume first** in hemorrhagic shock — IV fluids and blood products. Vasopressors are added only after adequate volume resuscitation if MAP still < 65.

✗ **WRONG THINKING**

"Chest tube drainage of 150 mL/hr is no big deal."

✓ **NCLEX RIGHT ANSWER**

> **200 mL/hr × 2–4 hrs** OR > **1,500 mL initially** = surgical thoracotomy indication. Notify provider for trending up; document hourly.

SECTION 08

8

Patient & Family Education



Pulmonary Hygiene

Use **incentive spirometer** q1h while awake (10 breaths). Deep breathing + coughing every 2 hours. Splint chest with a pillow when coughing.



Activity Progression

Ambulate early (with chest tube secured below chest level). Avoid lifting > 5–10 lbs until cleared. Resume normal activity gradually over 4–6 weeks.



Pain Control

Stay ahead of pain — adequate pain control allows deep breathing. Report pain > 4/10. Do **not** ignore pain to avoid medication.



Chest Tube Site Care

Keep dressing clean, dry, occlusive. Do not pull on tubing. Keep collection device upright and **BELOW** chest level. Report leaks, soaking, or popping out.



When to Call 911 / Provider

Sudden **shortness of breath, sharp chest pain, fever, increased drainage, bright red bleeding, dizziness, fainting**, or tube dislodgement.



Lifestyle

Stop smoking — slows healing, increases pneumonia risk. Avoid air travel until cleared by provider. Follow up for repeat CXR.



If on Anticoagulants

Discuss with provider when to safely resume warfarin, DOACs, or antiplatelets. Wear medical alert ID. Use soft toothbrush, electric razor.



Follow-Up Care

Repeat CXR 2–4 weeks post-discharge to confirm full lung re-expansion. Pulmonary rehab if persistent dyspnea. Trauma clinic if injury-related.

SECTION 09

9

Memory Boosters & Mnemonics

BLOOD

Hemothorax Signs

- B** — Breath sounds diminished/absent
- L** — Low BP (late) + tachycardia (early)
- O** — O₂ saturation drops; cyanosis
- O** — One-sided dullness on percussion
- D** — Dyspnea + chest pain (pleuritic)

DOPE

Chest Tube Troubleshooting

- D** — Dislodgement (tube out of pt → 3-sided dressing)
- O** — Obstruction (clot/kink → check for tidaling)
- P** — Pneumothorax (new air leak → continuous bubbling)
- E** — Equipment failure (cracked unit, loose connection)

TRAUMA

Massive Hemothorax Triggers Surgery

- T** — Tracheal deviation
- R** — Rapid drainage (> 200 mL/hr × 2–4 hrs)
- A** — Acute hypotension despite resuscitation
- U** — Unstable hemodynamics
- M** — Massive initial output (> 1,500 mL)
- A** — Air-hunger with persistent respiratory distress

DULL

Percussion = Fluid (Hemo)

D ull on percussion = **D** ense fluid (blood) = hemothorax

H yperresonant = **H** ollow air = pneumothorax

Quick rule: Fluid Falls (gravity), so dullness is at the base.

Air Ascends, so hyperresonance is at the apex.

3-2-1

3 Chambers, 2 RNs, 1 Goal

- 3** — Chest drainage chambers: Collection · Water Seal · Suction Control
- 3** — Sides taped if tube comes out (flutter valve)
- 2** — Large-bore IVs · 2 RNs verify blood
- 1** — Goal: Re-expand the lung & restore volume

ABCs

Hemothorax Priority Order

- A** — Airway: position upright, suction PRN
- B** — Breathing: O₂, chest tube, monitor SpO₂
- C** — Circulation: 2 large IVs, fluids, blood, pressors LAST

Remember: in hemorrhagic shock — volume BEFORE pressors.



SECTION 10 • NGN 2026 TEST PLAN

NCJMM Clinical Judgment Scenario

SCENARIO

A 28-year-old male is admitted to the ED following a high-speed MVC. He was the unrestrained driver. On arrival: alert but anxious, RR 32, HR 124, BP 102/68, SpO₂ 89% on 4 L NC, complaining of right-sided sharp chest pain. Inspection reveals seatbelt bruising across the right chest. Auscultation: breath sounds diminished on the right; percussion: dullness over the right lower lung field. CXR shows blunting of the right costophrenic angle with a moderate fluid line. A 36-Fr chest tube is inserted; immediate output 850 mL bright red blood. Two hours later, hourly chest tube output is now 220 mL, 240 mL, and 250 mL. BP is trending down: 90/58 → 84/52. Patient is becoming pale and confused.

LAYER 1

Recognize Cues

- **Trauma:** MVC, seatbelt sign R chest
- **Resp:** RR 32, SpO₂ 89%, ↓ breath sounds R
- **Percussion:** Dullness R lower lung
- **CT output:** 850 mL initial, then 220/240/250 mL/hr
- **Hemodynamics:** HR 124, BP trending 102→84 SBP
- **Mental status:** anxious → confused
- **Skin:** pale (hypoperfusion)

LAYER 2

Analyze Cues

- Cues cluster around **chest trauma + pleural blood + hemodynamic decline**
- Dullness + ↓ breath sounds R = fluid in pleural space (blood)
- Sustained drainage > 200 mL/hr × 3 hrs = **ongoing hemorrhage**
- Tachycardia + falling BP + confusion = **Class III hemorrhagic shock** evolving
- Hypoxia despite O₂ = lung compression worsening

LAYER 3

Prioritize Hypotheses

- 🚨 **Massive hemothorax with ongoing hemorrhage** requiring surgical exploration (highest priority)
- 🧠 Hypovolemic shock from blood loss
- 🫁 Respiratory failure from lung compression
- Rule out: tension pneumothorax (assess for tracheal deviation, JVD), cardiac tamponade (Beck's triad)

LAYER 4

Generate Solutions

- Activate **massive transfusion protocol** (PRBC:FFP:platelets 1:1:1)
- Notify **trauma surgery STAT** — patient meets criteria for thoracotomy
- Ensure 2 large-bore IVs; start warmed crystalloid
- Increase FiO₂ → consider intubation if SpO₂ does not improve / LOC continues to decline
- Type & crossmatch ≥ 4 units PRBCs; recheck H&H, coags, lactate
- Consider **TXA 1 g IV** if within 3 hours of injury
- Prepare for OR / ICU transfer

LAYER 5

Take Action

- Apply NRB at 15 L/min; reassess SpO₂ + work of breathing
- Bolus 1 L warmed LR while blood is en route
- Initiate **PRBC + FFP transfusion** per MTP
- Continuous cardiac monitor + arterial line; insert Foley
- Document hourly CT output; do NOT clamp or strip tube
- Notify family; obtain surgical consent

LAYER 6

Evaluate Outcomes

- **Effective:** HR ↓ to < 100; SBP > 100; SpO₂ > 94%; LOC improving; CT output trending down; urine output > 0.5 mL/kg/hr; lactate clearing
- **Ineffective / Escalate:** persistent > 200 mL/hr CT output, SBP still < 90 despite resuscitation, worsening LOC, ↑ lactate → **emergent thoracotomy**
- Post-op: monitor for re-bleeding, ARDS, empyema, atelectasis, retained hemothorax requiring VATS

- Reassess VS, LOC, SpO₂ q5 min

Diane's NGN NCLEX 2026 Visual Study Library

HEMOTHORAX • RESPIRATORY • CHEST TRAUMA CLUSTER