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Paramedic Trauma Study Guide

2025-2026 Edition - PHTLS / NREMT Paramedic Aligned
Hemorrhage Control - Thoracic Trauma - TBI - Shock - Transport Decisions

Trauma = ~15-20% of NREMT Paramedic exam. Master hemorrhage control, airway decisions, shock resuscitation, and time-critical transport.

Core Paramedic Trauma Principle (2025-2026):
Time is tissue. Every minute of uncontrolled hemorrhage, hypoxia, or hypotension costs neurons, myocardium, and limbs.

The goal is **Damage Control Resuscitation**: Stop the bleeding, secure the airway, restore perfusion just enough to reach the OR, and get to a surgeon before the patient crosses the point of no return.

Section 1: Primary Survey - C-ABCDE Trauma Sequence

C **Catastrophic Hemorrhage** - STOP THE BLEED FIRST

- **Tourniquets:** High & tight, note time applied
- **Junctional hemorrhage:** Combat Ready Clamp, SAM Junctional Tourniquet
- **Wound packing:** Hemostatic gauze (QuikClot, Celox) + direct pressure
- **Pelvic binder:** Commercial or sheet at greater trochanters
- **TXA:** 1 g IV/IO over 10 min (within 3 hours of injury)

A **Airway** with C-spine Protection

- Jaw thrust + manual inline stabilization
- Definitive airway if: GCS ≤8, inability to protect airway, prolonged transport
- Video laryngoscopy + bougie preferred; RSI/DSI if indicated

B **Breathing** & Ventilation

- **Tension pneumo:** Needle decompression (4th/5th ICS anterior axillary or 2nd ICS MCL)
- **Open pneumo:** Vented chest seal
- Avoid hyperventilation - target $EtCO_2$ 35-45 mmHg

C **Circulation** & Hemorrhage Control

- IV/IO large-bore access (two lines if possible)
- **Permissive hypotension** in penetrating torso trauma (SBP ~90 or palpable radial)
- Balanced crystalloid or whole blood if available
- Vasopressors (norepinephrine) for neurogenic shock

D **Disability** - Neuro Status

- GCS trending, pupils (PERRL), glucose check
- Seizure control if post-traumatic (midazolam/levetiracetam)

E **Exposure / Environment**

- Full exposure for complete assessment
- Prevent hypothermia - warm blankets, fluid warmers, minimize exposure time

Section 2: Hemorrhage Control Mastery

Bleeding Type	Immediate Intervention	Secondary / Adjunctive	Key 2025 Judgment Notes
Extremity arterial spurting	Tourniquet high & tight, note time	Second tourniquet if needed, hemostatic packing if junctional	Multiple tourniquets OK; document times; reassess distal neuro
Junctional (groin, axilla, neck)	Direct pressure + junctional tourniquet or hemostatic packing	TXA 1 g IV/IO	Time-critical; junctional devices save lives when packing fails
Torso / abdominal penetrating	Wound packing + pressure dressing	TXA, permissive hypotension, rapid transport	Do NOT probe wounds; get to surgeon
Pelvic instability	Pelvic binder at greater trochanters	TXA, cautious fluids, rapid transport	Do NOT log-roll if unstable pelvis suspected

TXA Protocol (2025)

- **Loading:** 1 g IV/IO over 10 minutes
- **Maintenance:** Second 1 g over 8 hours if prolonged transport (per protocol)
- **Window:** Most effective within 3 hours of injury
- **Caution:** Do NOT give as rapid bolus (seizure risk)

⚠ Lethal Triad of Trauma (Death Spiral)

- **Hypothermia** - impairs clotting
- **Acidosis** - impairs enzyme function
- **Coagulopathy** - bleeding won't stop

Prevention:

- Warm fluids, blankets, limit exposure
- Limit crystalloid (dilutes clotting factors)
- Damage control - get to OR fast

Section 3: Thoracic Trauma - Life Threats You Must Recognize

Injury	Classic Signs	Paramedic Intervention	Transport Priority
Tension Pneumothorax	Severe dyspnea, absent breath sounds, tracheal deviation, JVD, hypotension	Immediate needle decompression (4th/5th ICS anterior axillary preferred)	Highest - decompress before transport if unstable
Open Pneumothorax	Sucking chest wound, bubbling	Vented chest seal (preferred) or 3-sided occlusive	High - monitor for tension
Massive Hemothorax	Dullness to percussion, absent breath sounds, shock	IV/IO fluids/TXA, rapid transport	High - chest tube definitive (hospital)
Flail Chest / Pulmonary Contusion	Paradoxical movement, severe pain, hypoxia	Positive pressure ventilation, pain control (ketamine/fentanyl), high-flow O_2	Moderate - support oxygenation, avoid over-ventilation

Section 4: Traumatic Brain Injury (TBI) & Spinal Cord Judgment

TBI Goals (2025)

- **Maintain CPP:** SBP >90 mmHg adult, >80 mmHg child
- **Avoid hypoxia:** SpO_2 ≥94%
- **Avoid hyperventilation** unless herniation signs (Cushing triad, blown pupil) → brief $EtCO_2$ 30-35 mmHg
- **Head elevated 30°** if no hypotension/spinal injury
- **Seizure prophylaxis** if high risk (midazolam)

Neurogenic Shock (Spinal Cord Injury)

- **Classic triad:** Hypotension + bradycardia + warm/dry skin
- **Treatment:** Fluids first → vasopressors (norepinephrine) if refractory
- **Goal:** Maintain MAP ≥85-90 mmHg to preserve cord perfusion

Section 5: Shock Recognition & Resuscitation

Shock Type	Mechanism	Signs	Treatment
Hypovolemic (Hemorrhagic)	Blood loss	Tachycardia, hypotension, cool/pale, delayed cap refill	Stop bleeding, permissive hypotension, blood products
Obstructive (Tension Pneumo)	Impaired venous return	JVD, absent breath sounds, hypotension	Needle decompression
Obstructive (Tamponade)	Pericardial blood	Beck's triad: JVD, muffled heart sounds, hypotension	Fluids, pericardiocentesis (hospital), rapid transport
Neurogenic	Spinal cord injury (loss of sympathetic tone)	Hypotension + bradycardia + warm/dry skin	Fluids (cautious), vasopressors (norepinephrine)

Permissive Hypotension (Damage Control Resuscitation)

- **Penetrating torso trauma:** Target SBP ~90 mmHg or palpable radial pulse
- **Blunt trauma:** Generally target SBP ≥90 (more liberal)
- **TBI present:** Target SBP ≥110 (brain needs perfusion)
- **Rationale:** High BP → clot disruption → more bleeding

Section 6: High-Yield NREMT / Street Judgment Questions

Q1: 28 y/o GSW to abdomen, SBP 68/P, HR 140, alert but pale. 25 min to Level I trauma center.

A: TXA 1 g IV/IO, pelvic binder if unstable pelvis, permissive hypotension (SBP ~90), rapid transport. Avoid large crystalloid boluses.

Q2: 45 y/o MVC, absent breath sounds right side, tracheal deviation left, SBP 80/P.

A: Immediate needle decompression → vented chest seal if open wound → fluids/TXA → trauma center.

Q3: 22 y/o motorcycle crash, GCS 7, right pupil blown, BP 150/90, HR 52.

A: Cushing's triad = herniation. Brief hyperventilation ($EtCO_2$ 30-35), head elevated 30°, rapid transport to trauma center with neurosurgery.

Q4: 35 y/o fall from height, bilateral femur fractures, BP 88/60, HR 130, cool/pale.

A: Hemorrhagic shock (femurs hold 1-2L blood each). TXA, splint fractures, balanced fluid resuscitation, rapid transport.

Q5: 19 y/o fall from height, GCS 7, blown left pupil, BP 190/100, HR 48.

A: Brief hyperventilation to $EtCO_2$ 30-35 mmHg, head elevated, rapid neurosurgical center transport.

Q6: 60 y/o pedestrian vs. car, suspected pelvic fracture, SBP 70/P, alert.

A: Pelvic binder, TXA, cautious 500 mL crystalloid, permissive hypotension, rapid Level I transport.

Quick Trauma Math Example

Question: 80 kg trauma patient, protocol: TXA 15 mg/kg loading dose. How many mg?

Solution: 15 mg/kg × 80 kg = **1,200 mg (1.2 g)**

Reasoning: Weight-based dosing ensures adequate antifibrinolytic effect without excessive risk.

Section 7: Transport Decisions - Load & Go vs. Stay & Play

Load & Go (Time-Critical)

- Penetrating trauma to head/neck/torso
- Uncontrolled hemorrhage
- Traumatic arrest / near-arrest
- Flail chest / tension pneumo
- Traumatic amputation
- Signs of shock
- **Goal: ≤10 min scene time**

Consider Extended Scene

- Isolated extremity injury, stable
- Entrapped patient (fire rescue working)
- Mass casualty (triage ongoing)
- Remote/wilderness (prolonged transport inevitable)

Master Trauma Resuscitation

Think like a surgeon who's still 30 minutes away:

Stop the bleeding. Protect the airway. Restore just enough perfusion to reach the OR. Get there fast.

Every drop of blood you save is a minute of life you buy.

Stay aggressive. Stay controlled. Stay moving.
The trauma bay is waiting. Don't let them wait alone.