

Trauma Assessment & Management Protocol (Adult & Pediatric) — 2025 Edition

Purpose: Provide a clear, step-by-step protocol for the assessment, resuscitation, and early management of injured patients in prehospital and emergency department (ED) settings. Adapt to local policies, resources, and pharmacist/anaesthetist input where required.

Scope: Adults and children with blunt or penetrating trauma. Excludes specialized burn center care, obstetric emergencies beyond initial stabilization, and definitive surgical procedures.

Safety first: Scene safety, universal precautions, handover discipline, and early team activation are mandatory. Reassess after every intervention.

1) Team Activation & Roles (ED or Prehospital)

- **Trauma call criteria:** Any ABC compromise, GCS < 13, hypotension, penetrating torso injury, two or more long-bone fractures, pelvic injury, ejection or high-energy mechanism, or clinician concern.
 - **Roles (minimum):** Team lead, airway/ventilation, circulation/procedures, medications/runner, scribe/timekeeper, radiography/POCUS, porter.
 - **Pre-arrival brief (MIST):** Mechanism, Injuries suspected, Signs (vitals), Treatments given. Prepare bay: airway cart, blood products, pelvic binder, thoracostomy set, tourniquets, warmer.
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2) Primary Survey & Immediate Life-Saving Actions — **MARCH → ABCDE**

Treat life-threats as you find them. If deterioration occurs, **restart the primary survey.**

M – Massive hemorrhage

- Expose, identify, and **control external bleeding immediately:**
 - Direct pressure, pressure dressings.
 - **Tourniquet** for life-threatening limb bleeding (5–7 cm proximal to wound; avoid joints). Record **time on skin**.
 - **Hemostatic gauze** wound packing for junctional/axillary/groin bleeding.
 - **Pelvic binder** over **greater trochanters** for suspected pelvic injury.

A – Airway with C-spine protection

- Manual **in-line stabilization**; apply collar only if trained/indicated; avoid delaying airway care.
- Clear vomitus/foreign bodies; suction. Basic maneuvers (jaw thrust, oropharyngeal/nasopharyngeal airway if appropriate).
- If airway is not secure or patient cannot protect airway: **prepare for RSI** (see Section 7) or supraglottic airway as bridge.

B – Breathing/Ventilation

- Inspect, palpate, percuss, auscultate; SpO₂, EtCO₂ if intubated.
- **Life-threats & actions:**
 - **Tension pneumothorax:** immediate **needle decompression** (4th/5th intercostal space, anterior- to mid-axillary line) → definitive chest tube.
 - **Open pneumothorax:** occlusive 3-sided dressing; chest tube at a separate site.
 - **Massive hemothorax / flail chest:** chest tube; ventilatory support; urgent surgery consult.

C – Circulation with hemorrhage control

- 2 large-bore IVs ± IO; draw labs (FBC, type & screen/crossmatch, lactate, VBG/ABG, chemistries, coagulation). Warm patient and fluids.
- **Shock management:** permissive hypotension (adult SBP ~80–90 mmHg) **until hemorrhage control, except** suspected TBI (target SBP ≥ 110 age 15–49, ≥ 100 age 50–69). Child: age-appropriate targets (see Appendix A).
- Activate **massive transfusion protocol (MTP)** early (balanced products e.g., PRBC:Plasma:Platelets ~1:1:1). Minimize crystalloids.
- Consider **TXA** within 3 hours of injury in bleeding trauma (adult: 1 g IV over 10 min, then 1 g over 8 h).

D – Disability (neurologic)

- GCS; pupils; blood glucose. Seizure control if needed. For suspected TBI: avoid hypoxia/hypotension; maintain EtCO₂ 35–40 mmHg if ventilated; head midline, elevate 30° if not hypotensive.

E – Exposure/Environment

- Fully expose and **prevent hypothermia** (active warming, warmed fluids/products). Check back and posterior thorax on log-roll with C-spine control.

Adjuncts during Primary Survey - POCUS/FAST, portable CXR and pelvic X-ray (if not delaying resuscitation). - Urinary catheter (contraindicated with suspected urethral injury) and gastric decompression (NG/OG; avoid NG with cribriform plate fracture; use OG if facial trauma).

Decide & move: Immediate OR/IR, CT, or ED procedures based on physiology and response to resuscitation.

3) Secondary Survey (Head-to-Toe) & AMPLE History

- **AMPLE:** Allergies, Medications (incl. anticoagulants/antiplatelets), Past medical/obstetric, Last meal, Events/environment.
 - Systematic head-to-toe exam with full exposure; palpate spine, chest, pelvis, long bones; neurovascular checks; photograph/document wounds (with consent per policy).
 - **Pain control** early and titrated (see Section 8). Splint fractures; reassess distal pulses.
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4) Imaging Strategy

- **Unstable:** FAST (+/- pelvic X-ray). **Positive** → **OR/IR**. Do not delay for CT.
 - **Stable or stabilized:** Contrast **CT chest/abdomen/pelvis ± head/neck** based on mechanism/exam.
 - **C-spine clearance:** Use validated rules (e.g., NEXUS/Canadian C-Spine) when appropriate; otherwise CT.
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5) Hemorrhage & Shock Resuscitation Bundle

- Hemorrhage control (tourniquet/binder/surgery/IR) + **early balanced transfusion**.
 - Warm patient/products; monitor calcium (replace if ionized Ca < 1.1 mmol/L).
 - Point-of-care lactate, ultrasound IVC/cardiac as needed.
 - **TXA** (adult) within 3 h as above; avoid if clear contraindications per local policy.
 - Urine output targets: **Adult** ≥ 0.5 mL/kg/h; **Child** ≥ 1 mL/kg/h.
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6) Chest, Abdominal, Pelvic & Extremity Injuries — Key Actions

- **Chest:** Decompress tension; chest tube for pneumo/hemo; consider pericardiocentesis for tamponade if arresting and no immediate thoracotomy available.
- **Abdomen:** FAST positive with instability → OR. Consider gastric decompression; broad-spectrum antibiotics for penetrating injury.
- **Pelvis:** Binder over trochanters; avoid log-rolling unstable pelvis; early IR/surgery consult.

- **Extremities:** Control bleeding, reduce grossly deformed fractures if neurovascular compromise; splint; **open fractures:** sterile dressing, **antibiotics within 1 hour** (see Section 9), tetanus.
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7) Airway & RSI Quick Guide (Adults)

- **Indications:** Failure to maintain/protect airway, failure of oxygenation/ventilation, expected clinical course, or combativeness preventing care.
 - **Checklist:** Pre-oxygenate, suction, monitoring (ECG, NIBP, SpO₂, EtCO₂), difficult airway plan (bougie, VL, supraglottic, surgical airway kit), drug doses calculated.
 - **Induction options:**
 - **Ketamine 1–2 mg/kg IV** (hemodynamically stable/unstable; good for bronchospasm).
 - **Etomidate 0.3 mg/kg IV** (if available; neutral hemodynamics).
 - **Paralysis: Rocuronium 1.2 mg/kg IV** (or **Succinylcholine 1.5 mg/kg IV**; avoid in hyperkalemia, crush/burns >24 h, neuromuscular disease).
 - **Post-intubation:** Confirm with EtCO₂, secure tube, set lung-protective ventilation (target EtCO₂ 35–40 mmHg in TBI), start sedation/analgesia.
 - **Failed airway:** 2 attempts max → supraglottic device → **surgical airway** if cannot oxygenate.
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8) Analgesia & Sedation (Initial ED Dosing)

Tailor to age, weight, comorbidities, and physiology. Reassess pain frequently.

Analgesia (adults): - **Ketamine (analgesic) 0.1–0.3 mg/kg IV** slow push; or 0.5–1 mg/kg IM if no IV. - **Morphine 0.05–0.1 mg/kg IV**, titrate every 5–10 min; or **Fentanyl 1 mcg/kg IV**. - **Paracetamol 1 g IV/PO** (15 mg/kg in children); **Ibuprofen 400 mg PO** if no bleeding risk/renal issues.

Sedation (post-intubation/ED procedures): - **Fentanyl infusion 0.7–1.5 mcg/kg/h ± Midazolam 0.02–0.1 mg/kg/h** or **Propofol 5–50 mcg/kg/min** (avoid hypotension; monitor).

9) Antibiotics, Tetanus & Other Early Medications

- **Open fractures:**
 - Gustilo I–II: **Cefazolin 2 g IV** (3 g if >120 kg) q8h.
 - Gustilo III: **Cefazolin + Gentamicin 5 mg/kg IV**; add **Metronidazole 500 mg IV** for farm/soil/colon contamination.
- **Penetrating abdomen/chest: Ceftriaxone 2 g IV + Metronidazole 500 mg IV.**
- **Tetanus:** Per vaccination status and wound type.

- **TXA:** Adult dosing as per Section 5.
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10) Special Populations & Situations

- **Children:** Weight-based doses; narrow airways; higher O₂ demand. Use length-based tape. Hypotension is late—treat early.
 - **Pregnancy:** Left uterine displacement; RhIG if indicated; consider perimortem cesarean if maternal arrest ≥ 20 weeks and no ROSC by 4 minutes.
 - **Elderly/anticoagulated:** Lower physiologic reserve; lower threshold for CT/head bleed workup; reverse anticoagulants per local protocol.
 - **Burns:** Stop burning, cool <10 min (avoid hypothermia), dry cover, analgesia. Estimate TBSA; consider Parkland (4 mL/kg/%TBSA) for ≥20% TBSA adults.
 - **Crush injury/rhabdomyolysis:** Early fluids, monitor K⁺, avoid succinylcholine; treat hyperkalemia.
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11) Disposition & Transfer

- **Definitive care decision:** OR/IR vs. CT/ICU vs. ward based on physiology, injuries, and resources.
 - **Inter-facility transfer:** Stabilize life-threats, send copies of imaging/labs, provide **MIST/SBAR** handover, maintain warming, oxygen, and infusions en route.
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12) Documentation, Handover & Quality

- **Time-stamped flow chart** of vitals, interventions, responses.
 - Use **MIST** for prehospital → ED; **SBAR** for ED → OR/ICU/transfer.
 - **Debrief within 24 h;** record lessons learned. Maintain trauma registry; perform audit & feedback.
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Quick Checklists

A) 60-Second Trauma Check (on arrival)

- ☐ Verbalize **MIST**; confirm team roles
- ☐ Massive bleed? → pressure/tourniquet/binder
- ☐ **Airway:** talking? suction? adjunct/RSI kit ready
- ☐ **Breathing:** chest rise, trachea, decompress if tension
- ☐ **Circulation:** pulses, access, MTP, TXA, warm
- ☐ **Disability:** GCS, pupils, glucose
- ☐ **Exposure:** fully exposed, warming, posterior check

B) Chest Decompression Landmarks

- 4th/5th intercostal space at anterior- to mid-axillary line; insert just above rib border to avoid neurovascular bundle.

C) Pelvic Binder Placement

- Centered over greater trochanters (not iliac crests). Reassess distal pulses.
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Appendix A: Normal Vital Signs (Selected)

Adults: - RR 12–20/min; HR 60–100/min (beta-blocked/elderly may be lower); SBP $\geq$ 100–110 in TBI; Temp 36–37.5 °C.

Children (rough guide): - Infant HR 110–160; SBP $\geq$ 70 + (2 × age in years). Urine $\geq$ 1 mL/kg/h.

Appendix B: Sample RSI & Medication Reference (Adults)

- **Induction:** Ketamine 1–2 mg/kg IV (or Etomidate 0.3 mg/kg IV)
 - **Paralysis:** Rocuronium 1.2 mg/kg IV (or Succinylcholine 1.5 mg/kg IV if no contraindications)
 - **Analgesic ketamine:** 0.1–0.3 mg/kg IV
 - **Morphine:** 0.05–0.1 mg/kg IV titrated
 - **Fentanyl:** 1 mcg/kg IV bolus
 - **TXA (bleeding trauma within 3 h):** 1 g IV over 10 min, then 1 g over 8 h
 - **Calcium chloride:** 10 mL of 10% IV for hypocalcemia during MTP (per labs)
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Appendix C: Example Antibiotic Starter Guide

- **Open fracture I–II:** Cefazolin 2 g IV q8h
 - **Open fracture III:** Cefazolin + Gentamicin 5 mg/kg IV; add Metronidazole 500 mg IV if contamination
 - **Penetrating abdomen/chest:** Ceftriaxone 2 g IV + Metronidazole 500 mg IV
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References & Notes

- This protocol is adapted for general emergency care contexts and should be **locally ratified** by your hospital trauma committee, anesthesia, surgery, pediatrics, and pharmacy before use. Replace medications with locally available alternatives as needed. Update annually.

Appendix D: Why MARCH Comes Before ABCDE

Background:

- Traditional trauma teaching (ATLS) follows **ABCDE** — *Airway, Breathing, Circulation, Disability, Exposure*. This is still the cornerstone of emergency department assessment.
- Modern military and prehospital trauma care introduced **MARCH** — *Massive Hemorrhage, Airway, Respiration, Circulation, Head injury/Hypothermia* — because of the realities of battlefield and field injuries.

Why the “M”?

- **Catastrophic bleeding kills faster than airway compromise.** A femoral artery bleed can cause death in under 3 minutes, often before airway obstruction develops.
- Studies from combat casualties showed the majority of preventable deaths were from **external hemorrhage**, not airway.

Conceptual fit:

- **ABCDE** ensures a systematic, hospital-ready approach.
- **MARCH** prioritizes immediate hemorrhage control in prehospital or tactical environments.
- Combining them as **MARCH → ABCDE** merges both strengths: stop life-threatening bleeding immediately, then proceed systematically without missing airway, breathing, circulation, neurologic status, and exposure.

In practice:

- If no catastrophic bleeding is found, simply continue with ABCDE.
- If massive hemorrhage is present, control it first (tourniquet, hemostatic dressing, pelvic binder) before moving to airway.

Take-home:

- **MARCH is not replacing ABCDE** — it enhances it for environments where catastrophic bleeding is a leading cause of preventable death.
 - In most modern trauma systems, clinicians are taught **MARCH followed by ABCDE** so both principles are covered.
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