BEARAMEDICS FIELD GUIDE

THE PLATINUM TEN

Prehospital Trauma, First Contact to Handoff

The golden hour starts with the platinum ten.



STOP IT | READ IT | FIX IT | CALL IT | GO

0:00 — 10:00

01 Inside the Ten
Bleeding, airway, chest, triage, and the trauma alert

02 After the Ten
Special patients, burns, arrest, MCI, handoff, and a self-test

For EMS Providers
Built on San Luis Obispo County EMS trauma protocols, with the evidence, pearls, and scenarios behind them

START

How to Use This Guide

A study book for the trauma patient you have not met yet.

Trauma calls reward the provider who already decided what to do before the tones dropped. This guide is built to get you there. Every chapter starts from what the San Luis Obispo County EMS Agency (SLOEMSA) actually tells you to do, then explains the physiology underneath it, then adds what the current research and experienced crews would want you to know. It is written for paramedic interns, and it is meant to be useful to any EMS provider who runs trauma in this county.

WHAT THIS IS

- A study and reference guide organized the way a trauma call unfolds, from the scene to the chart.
- Anchored to current county protocols, policies, and formulary, cited by number.
- Ten scenarios and a thirty-question self-test at the back, with answers and citations.

WHAT THIS IS NOT

- **Not a treatment protocol.** Treat per the current SLO County EMS protocols. When this guide and a county document disagree, the county wins.
- Not issued, reviewed, or endorsed by SLOEMSA, any base hospital, or any employer.
- Not a substitute for your FTO, your base hospital, or your judgment at the bedside.

The key

MARK	MEANING
#660	SLOEMSA protocol, procedure, or policy number. Go read the source page; this guide paraphrases it.
PEARL	Beyond county protocol: from the evidence base or field experience. Useful knowledge, never permission to do something the protocol does not allow.
BASE	Base hospital order only. You may know the dose; you still need the order.
EVIDENCE	A study or national guideline behind the point. Full references are in Appendix D.

THE RULE — What the county says. Doses and limits come from here only.

THE WHY — The physiology that makes the rule stick under stress.

PEARL — Tricks, patterns, and what the textbook buries.

PITFALL — Where good crews go wrong on real calls.

EVIDENCE — What the research shows, and its limits.

SAY IT — Words for the radio, the bedside, your partner.

FROM THE DEN — Station humor with a memory hook.

Sources and versions

Built from the SLOEMSA protocol and formulary compilations with revisions through 08/07/2026, plus Policies #124, #125 (effective 01/21/2026), #151, #153 with Attachment A (effective 01/01/2026), and #155 (effective 09/30/2025). Each protocol carries its own effective date; several trauma protocols (#660, #702, #706, #713, #714) are dated 08/01/2019 and remain current. When two county sources disagreed, the newer effective date was followed, and the disagreement is listed in **Appendix C** so you can ask about it rather than guess. Evidence was reviewed through October 2026.

County documents are publicly available from SLOEMSA and are cited here by number with the agency as the source. Protocols change. Before you rely on a number in this book, confirm it against the current county page.

How to study it

BEFORE A SHIFT

Read one part. It takes about twenty minutes.

AFTER A TRAUMA CALL

Find the chapter for what you saw and read the Pitfall boxes. Which one did you almost step in?

EVERY WEEK

Run two scenarios out loud with your partner, then take the self-test without looking.

Prepared by **Thomas Moore, EMT-P** · v1.2 · Oct 2026 · An independent Bearamedics project

BOOK

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Read it front to back once. Then use it like a toolbox.

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The Platinum Ten on One Page

SLOEMSA targets scene departure in 10 minutes or less for trauma alerts and consults **#601** **#153**. *This is how the ten minutes get spent.*

STOP AND FIX FIRST: Spurting or pooling blood · Airway you can hear · No breathing or a silent hemithorax with shock · Pulseless after injury. Everything else waits for these.

0 to 1
SCENE & FIRST LOOK

Scene safe, PPE, number of patients, mechanism. Sick or not sick from the doorway. Massive bleeding: pressure or tourniquet now **#706**.

1 to 3
PRIMARY SURVEY

Airway with spine in mind, breathing and chest (look, listen, feel both sides), pulses and skin, GCS and pupils, expose and cover. Fix as you find **#601**.

3 to 6
DECIDE & PACKAGE

Name the triage step **#153**. SMR only if indicated **#702**. Binder if all three criteria **#713**. Splint only what moves you faster.

6 to 9
MOVE

Load. Patient covered and warm. Monitor on. Alert or consult early, from scene if you can **#153**.

9 to 10
WHEELS

IV, fluids, TXA, pain control, reassessment, secondary survey: en route, not on scene **#660**.

TRAUMA ALERT
STEP 1 OR 2 → CLOSEST TRAUMA CENTER

Step 1, adult: GCS 13 or less · SBP under 90 · RR under 10 or over 29.
Step 1, child (34 kg or less): GCS 13 or less, poor perfusion, or age-based HR, RR, or SBP out of range.
Step 2: penetrating head, neck, torso, or extremity above elbow or knee · flail or chest wall deformity · two proximal long-bone fractures · mangled, degloved, or pulseless limb · open or depressed skull fracture · paralysis · pelvic injury with a high-risk mechanism.

Marian south of El Campo Rd; Sierra Vista north **#153**

TRAUMA CONSULT
STEP 3 OR 4 → CALL SLO TRAUMA CENTER

Step 3: fall over 20 ft (child over 10 ft or twice their height) · intrusion over 12 in at occupant or 18 in anywhere · ejection · death in the compartment · auto vs pedestrian or bike thrown, run over, or over 20 mph · motorcycle or unenclosed vehicle over 20 mph.
Step 4: provider judgment · age over 65 (SBP under 110 may be shock) · child · pregnancy over 20 weeks · anticoagulant (not aspirin) with head injury · burns with trauma mechanism.

Only ALS may request a consult **#153**

THE NUMBERS YOU CARRY IN YOUR HEAD

ITEM	ADULT	PEDIATRIC (34 KG OR LESS)	SOURCE
Fluid trigger	SBP 90 or less, or no peripheral pulses	Hypotension for age	**#660**
Normal saline	Up to 500 mL, may repeat once	20 mL/kg, max 500 mL, may repeat once	**#660**
TXA	1 g in 100 mL over 10 min, once, 15 and older, within 3 h	Not under 15	**#714**
Fentanyl	50 to 100 mcg slow IV (25 mcg if over 65), max 200 mcg	1.5 mcg/kg IN or 1 mcg/kg IV/IM	**#603**
Ketamine	0.3 mg/kg (max 30 mg) IV over 10 min, or 0.5 mg/kg (max 40 mg) IM, once	Not approved	**#603**
Tourniquet	2 to 4 in above the wound, not over a joint, time written on the device, never covered		**#706**
Needle decompression	2nd ICS midclavicular or 4th ICS midaxillary, over the top of the rib, catheter no larger than 10 Ga		**#705**
TBI targets	SpO2 94% or higher per county and never below 90%, no hypotension, EtCO2 35 to 45, no routine hyperventilation		**#602** PEARL

SAY IT: THE MIVT RADIO REPORT

"Sierra Vista, Medic 32, TRAUMA ALERT, Step 1 and Step 2 criteria: hypotension and penetrating torso. ETA 14 minutes. 34-year-old male, single stab wound left upper quadrant. Pressure 88 over 60, pulse 124, respirations 24, GCS 15. Two large-bore lines, 500 normal saline, TXA started 1420. Will update five minutes out."

PART

01

Foundations

How trauma kills, how the county wants it run, and how to read a scene before you touch the patient.

1 How Trauma Kills
2 How SLO County Runs a Trauma Call
3 Reading the Scene: Mechanism and Kinematics
4 The Primary Survey
5 Secondary Survey, Vitals, and Reassessment

COUNTY DOCUMENTS IN THIS PART #601 · #601-A · #153 · #660 · #701



★ ★ ★ ★ ★

CHAPTER 1

How Trauma Kills

If you know what kills them, you know what to fix first.

Trauma is the leading killer of young Americans, and a meaningful share of those deaths are preventable with things you carry: a tourniquet, a needle, oxygen, a bag-valve mask, a binder, a fast decision about destination. Every intervention in this book exists to interrupt one of a small number of killers.

The three killers you can fix

1 · BLEEDING

Hemorrhage is the leading preventable cause of trauma death. Most of those deaths happen in the first hours, many before the hospital. External bleeding you can see and stop. Internal bleeding (chest, belly, pelvis, thighs) you can only recognize, slow, and deliver to a surgeon fast.

2 · OXYGEN

Airway obstruction, a collapsed or tension-filled lung, a flail segment, or a brain that stopped telling the lungs to breathe. Hypoxia kills tissue in minutes and doubles the damage of every other injury, especially in the brain.

3 · THE PUMP

Tension pneumothorax and cardiac tamponade squeeze the heart so it cannot fill. These are **obstructive** shock: no amount of fluid fixes them, and one of them (tension) is fixed with a needle in your kit.

The time pattern of trauma death

Trauma deaths cluster in three windows. The **first** is seconds to minutes: unsurvivable brain, heart, or great-vessel injuries. The **second** is minutes to a few hours: bleeding, airway and chest problems, and expanding head bleeds. This is the window EMS lives in, and it is why the county targets a scene time of 10 minutes or less for trauma alerts and consults #601 #153. The **third** is days to weeks: infection and organ failure, and it is shaped by how much shock, hypothermia, and hypoxia the patient suffered in the second window.

FROM THE DEN The oldest joke in EMS: all bleeding stops eventually. Your whole job is making sure it stops while the patient is still around to appreciate it. That is why X comes before A.

PEARL · WHY "PLATINUM TEN"

You will hear about the "golden hour." It is a teaching idea, not a hard physiologic line. What the evidence and the county both reward is **speed to definitive care**, and the part of that you control is the scene. The ten minutes on scene are the platinum part of the golden hour: spend them on things only you can do there (stop bleeding, open the airway, decompress the chest, decide the destination), and do everything else en route.

The lethal diamond PHYSIOLOGY

Bleeding patients slide into a vicious cycle. Each corner makes the others worse:

- **Hypothermia.** Clotting enzymes slow down as the body cools. A wet, exposed patient on asphalt cools fast, and so does one who just got a liter of room-temperature saline.
- **Acidosis.** Tissue that is not perfused makes lactic acid. Acid weakens clotting and the heart's response to its own adrenaline.
- **Coagulopathy.** Severe injury triggers trauma-induced coagulopathy within minutes, before any fluid is given. Diluting the blood with crystalloid makes it worse.
- **Hypocalcemia.** Calcium is a clotting cofactor and a heart muscle requirement. Low ionized calcium is common in severe trauma even before transfusion, and it is the newest corner of the diamond.

WHAT THE COUNTY GIVES YOU AGAINST IT

- Cover the patient after exposing them; maintain core temperature #601 #660.
- Stop the bleeding first #706.
- Limited fluid: up to 500 mL for hypotension, repeat once #660.
- TXA for hemorrhagic shock or uncontrolled bleeding #714.
- Fast transport to the place with blood and a surgeon #153.

EVIDENCE

Half of a large trauma cohort was hypocalcemic on arrival before receiving any blood products, which is why many authors now describe a "lethal diamond" instead of a triad. Empiric prehospital calcium for trauma is **not** supported yet and is not in county protocol; the takeaway for you is to keep them warm and stop the bleeding, which protects every corner at once. Brandt 2023 Ditzel 2020

Secondary injury: the damage you can cause or prevent

The **primary** injury happens at the moment of impact; you cannot change it. **Secondary** injury is everything that happens afterward: low oxygen, low blood pressure, low or high carbon dioxide, low or high temperature, low sugar. The injured brain is the most sensitive organ to secondary injury, which is why Chapter 14 is so specific about numbers. A good trauma crew is, above all, a crew that does not let secondary injury happen on their watch.

PITFALL · THE CALM, TALKING PATIENT

The patient with a lacerated spleen or a slow epidural bleed may be the most pleasant person you meet all day for the first twenty minutes. Normal vital signs at minute two mean only that they are compensating. Trend everything, believe the mechanism, and let the vitals tell you when compensation is ending, not whether it exists.

CHAPTER 2

How SLO County Runs a Trauma Call

The protocol map. Know which document you are working from before you need it.

County trauma care is not one protocol. It is a spine (#601 Universal, trauma column, and #660 General Trauma) with branches for procedures, special injuries, pain, and destination. Learn the map and you will always know where to look.

TRAUMA-RELEVANT SLOEMSA DOCUMENTS

#	TITLE	EFFECTIVE	WHAT IT CONTROLS FOR TRAUMA
#601	Universal (trauma column)	01/01/2026	Scene safety, airway, bleeding control, expose and warm, SMR, vascular access, trauma triage; 34 kg pediatric cutoff; scene time 10 min or less for specialty care
#601-A	Hemodynamic definitions	04/15/2017	Trauma instability for adults and children; stable, unstable, extremis, absent signs of life
#602	Airway management	01/01/2026	O2 to 94%, adjuncts, SGA/ETI, Magill, needle cric, needle thoracostomy references, placement confirmation
#603	Pain management	01/01/2025	Fentanyl, ketamine (multisystem trauma), IO lidocaine
#660 / #660-A	General trauma + attachment	08/01/2019	Fluids, TXA, binder trigger, base orders for neurogenic shock; face, eye, chest, belly, pregnancy, fractures, amputations
#661	Traumatic cardiac arrest	01/01/2025	Transport decisions, fluids, bilateral needle decompression, no routine epi or amiodarone
#630 to #634	Bites, temperature, drowning, burns, SCUBA	2019 to 2026	Environmental trauma; #633 Burns and #634 SCUBA are new (08/07/2026)
#701 to #718	Procedures	various	Capnography, SMR, CPAP, needle cric, needle thoracostomy, hemorrhage control, vascular access, binder, TXA, ETI, SGA
#125	Determination of death	01/21/2026	When to withhold or stop; traumatic arrest consults; START and JumpSTART in an MCI
#151	Destination	04/15/2017	MCI levels, MedCom role, specialty destinations
#153	Trauma triage and destination	01/01/2026	The four-step scheme, alert vs consult, closest trauma center, exceptions, report format; Attachment A is the decision-scheme flowchart
#155	EMS helicopter operations	09/30/2025	Who orders a helicopter, time and need criteria, early launch, cancellation, landing zones

The trauma column of #601 in order

BLS · EVERY TRAUMA PATIENT #601

1. Scene safety and PPE
2. Assess, establish, and maintain the airway; suction as needed
3. Pulse oximetry; O2 per #602
4. Evaluate breathing and circulation
5. Control life-threatening bleeding
6. Remove clothing to expose and identify injuries
7. Cover the patient to maintain core temperature
8. SMR if indicated #702

ALS ADDS

- Trauma triage and destination #153
- ALS treatment protocols (#660 and the rest), which bring in vascular access #710, fluids, and TXA
- Rapid transport for specialty care patients (trauma, STEMI, stroke): target scene departure 10 minutes or less
- Pediatric policies apply at 34 kg or less; use a length-based tape

What "unstable" means here #601-A

TRAUMA HEMODYNAMIC INSTABILITY · ADULT	TRAUMA HEMODYNAMIC INSTABILITY · PEDIATRIC (34 KG OR LESS)
• SBP under 90 mmHg • Poor perfusion: capillary refill, color, temperature • GCS 13 or less • Respiratory rate under 10 or over 30 • Pulse over 120	• GCS 13 or less; poor perfusion • RR over 60 or apnea; under 20 in infants under 1 year • HR, 5 and under (under 22 kg): under 80 or over 180 • HR, 6 and up (23 to 34 kg): under 60 or over 160 • SBP: newborn under 60; infant under 70; 1 to 10 years under 70 + (2 × age); 11 to 14 years under 90

#601-A also defines **extremis** (imminent death likely) and **absent signs of life** (obvious death, or pulseless and apneic with no heart or lung sounds, fixed dilated pupils, and signs of absent circulation). Those terms drive #661 and #125.

Base contact in trauma

Three different conversations happen on the radio, and new medics blur them together:

TRAUMA ALERT

Step 1 or 2. You are **telling** the closest trauma center you are coming. ALS makes the call, early, from scene if possible #153.

TRAUMA CONSULT

Step 3 or 4. You are **asking** the SLO trauma center (Sierra Vista) where to go. Only ALS may request it #153.

BASE ORDERS

You need something beyond standing orders: more fluid, push-dose epi for neurogenic shock, more pain medicine, tourniquet removal, termination #660 #706 #661.

PEARL

Include the step criteria in every trauma base report, and update the receiving facility five minutes out or with any change #660. The single most useful words you can say on the radio are the triage step and the number that put them there: "Step 1, SBP 84."

FROM THE DEN An alert is a statement; a consult is a question. Do not call Sierra Vista to ask permission to bring them a Step 1. They will say yes, and they will remember you.

CHAPTER 3

Reading the Scene: Mechanism and Kinematics

The car, the stairs, and the weapon tell you where to look. The patient tells you how bad it is.

Energy is the injury

Kinetic energy is one half of mass times velocity squared. Speed matters more than size: doubling the speed quadruples the energy. In every collision there are three impacts: the vehicle hits the object, the body hits the inside of the vehicle, and the organs hit the inside of the body. That third collision is why a patient with no external marks can have a torn aorta, a lacerated liver, or a sheared brain.

FROM THE DEN Every driver in history was going "like, thirty." The steering wheel keeps its own records. Double the speed, quadruple the energy, and believe the car.

THE WHY · DECELERATION INJURIES

Organs that are fixed at one point and free at another tear at the junction when the body stops suddenly. The aorta tears just past the ligamentum arteriosum; the kidneys and spleen tear at their pedicles; the brain shears at the gray-white junction (diffuse axonal injury). Sudden stops from high speed earn a high index of suspicion even when the exam is reassuring.

Motor vehicle collisions

IMPACT	WHAT HAPPENS	LOOK FOR
Frontal, up and over	Body rides up over the wheel; head hits windshield	Head and C-spine, chest (wheel deformity), abdomen (liver, spleen), aortic injury
Frontal, down and under	Body slides under the dash; knees strike first	Knee and patella, femur, hip dislocation (posterior), acetabulum, pelvis
Lateral (T-bone)	Door intrudes into the occupant; head whips toward impact	Pelvis and ribs on the impact side; spleen (left impact) or liver (right); lateral neck; worse than it looks for the same speed
Rear	Body accelerates; head lags	Neck hyperextension; second frontal impact if pushed into another car
Rollover	Multiple impacts in multiple directions	Anything; roof intrusion counts toward Step 3 intrusion criteria #153
Ejection	Two crashes: inside the car and then the ground	Automatic Step 3 consult, partial or complete #153

PEARL · READ THE CAR

- Starred windshield: head strike. Bent steering wheel or column: chest and belly.
- Knee dent in the dash: femurs, hips, pelvis.
- Measure intrusion: over 12 inches at the occupant's seat or over 18 inches anywhere in the compartment is Step 3 #153.
- Airbags deployed: facial abrasions, forearm fractures, and eye injuries; it does not mean "no injury."

PITFALL · THE SEATBELT SIGN

A bruise or abrasion across the belly from a lap belt means the bowel, mesentery, or lumbar spine took the load. The classic pair is a hollow-viscus injury and a flexion-distraction (Chance) fracture of the lumbar spine. A patient with a seatbelt sign and abdominal pain is not a "minor MVC."

FROM THE DEN The seatbelt saved their life and left a receipt. Read the receipt: bowel, mesentery, lumbar spine.

Other mechanisms

Falls

Height, landing surface, and what hit first. Adults falling over 20 feet (one story is about 10 feet) and children falling over 10 feet or twice their height are Step 3 #153. Landing on the feet sends load up the chain: heels (calcaneus), tibial plateau, hips, and lumbar compression fractures. Older adults break hips, wrists, ribs, and heads falling from standing (Chapter 22).

Auto vs pedestrian or bicyclist

Adults tend to turn and take a lateral hit: legs at bumper height, then hip and torso on the hood, then head on windshield or ground. Children are shorter, so the bumper hits the pelvis or chest and they are thrown or run over. Thrown, run over, or significant impact over 20 mph is Step 3 #153.

Motorcycles and unenclosed vehicles

No cage. Over 20 mph is Step 3 #153. Helmet damage equals head energy. Expect femurs, pelvis, open fractures, and road rash that hides deeper injury.

Penetrating trauma

Knife wounds injure what the blade touches; ask about length if the weapon is available, and remember a short entry can hide a long track. Gunshot wounds transfer energy along a path you cannot see: bullets tumble, fragment, and deflect off bone. Never chart "entrance" or "exit"; chart location, size, and appearance. All significant penetrating injuries to the head, neck, torso, or extremities above the elbow or knee are Step 2 #153. Look in the axillae, back, buttocks, scalp, and groin before you package. Taser barbs stay in: EMS does not remove them; law enforcement may #613.

Blast

Primary (pressure wave: ears, lungs, bowel), secondary (fragments), tertiary (the body thrown), quaternary (burns, crush, toxic gases). The patient with ringing ears and shortness of breath after a blast may have blast lung even without a mark on them.

Crush and entrapment

Prolonged compression of a large muscle mass leads to toxin and potassium release when the pressure is relieved. See Chapter 19.

> **EVIDENCE · MECHANISM VERSUS PHYSIOLOGY**
>
> Mechanism alone is a weak predictor of serious injury, which is why national field triage places mechanism in the lower-risk "yellow" category and physiology and anatomy in the high-risk "red" category, and why SLO makes mechanism a consult (Step 3) rather than an alert. Use mechanism to **raise suspicion and decide where to look**; use physiology and anatomy to decide **how fast and where to go**. ACS-COT Field Triage 2021

CHAPTER 4

The Primary Survey

Find what kills in the next five minutes, and fix it as you find it.

The primary survey is not a checklist you finish before you act. It is a loop: find, fix, move on, and come back. A good primary takes 60 to 90 seconds in the stable patient and can take three minutes in the sickest one, because you are treating as you go.

Order of operations

The county lists the trauma BLS steps together **#601**. Modern trauma systems teach them in a deliberate order, sometimes written **X-ABCDE** (eXsanguinating hemorrhage first) or **MARCH** (Massive hemorrhage, Airway, Respiration, Circulation, Hypothermia and Head). Both say the same thing: a patient who is visibly bleeding to death gets pressure or a tourniquet in the first seconds, while your partner opens the airway.

STEP	LOOK FOR	FIX NOW
X · Bleeding	Spurting, pooling, soaking through clothing, blood under the patient	Direct pressure, tourniquet, packing with hemostatic gauze **#706**
A · Airway	Snoring, gurgling, stridor, blood or teeth in the mouth, facial or neck trauma, burns	Jaw thrust with manual spine stabilization, suction, OPA or NPA (no NPA with suspected basilar skull fracture or major midface injury), BVM, SGA or ETI, needle cric **#602** **#704**
B · Breathing	Rate and effort, chest rise both sides, wounds, crepitus, paradoxical movement, breath sounds, JVD, trachea	O2 to 94% or higher, chest seal, support a flail, assist ventilation, needle decompression **#602** **#660-A** **#705**
C · Circulation	Radial pulse present, rate and quality; skin color, temperature, moisture; capillary refill; internal bleeding sites	Binder if criteria met, position, plan IV and fluids for en route **#713** **#660**
D · Disability	GCS (or at least AVPU and best motor), pupils, gross motor and sensation in all four limbs, glucose if altered	Prevent the second hit: oxygen, pressure, ventilation (Chapter 14)
E · Expose	Cut clothes; look front, back, axillae, groin, scalp; log roll only if needed	Cover immediately; heat the compartment **#601**

PEARL · THE 15-SECOND READ

Before you kneel down: is the patient talking in full sentences (airway and brain), what color are they, are they moving all four limbs, and where is the blood? A radial pulse you can feel at a normal rate in a talking patient buys you time to do a complete primary. A thready, fast radial or no radial in a pale, quiet patient means you are already late.

PITFALL · TUNNEL VISION ON THE OBVIOUS

The open tib-fib fracture is ugly and loud. The patient's quiet left chest is what is killing them. Do the primary survey on every patient, in order, even when one injury is screaming for attention. Deformed limbs almost never kill in the first ten minutes; chests and bleeding do.

FROM THE DEN Ugly is not a vital sign. The open fracture is the loudest thing on scene and the least likely to kill anyone in the next ten minutes. Nobody has ever survived because of a really beautiful scene IV, either.

The decision point

At the end of the primary survey you should be able to answer three questions out loud to your partner:

1. **Is this patient unstable?** Use the #601-A trauma instability list (Chapter 2). Any one item makes it a load-and-go call.

2. **What triage step are they?** Step 1 or 2 is an alert to the closest trauma center; Step 3 or 4 is a consult; none of the above is the closest appropriate ED #153.

3. **What must happen before we move?** Usually only bleeding control, airway, decompression of a tension, and safe packaging. IV access, fluids, TXA, pain control, splinting of non-threatening fractures, and the secondary survey happen en route #660.

The ten-minute budget

0:00	0:30	2:00	4:00	8:00
ARRIVE	**TOUCH**	**DECIDE**	**PACKAGE**	**GO**
Scene safe, PPE, resources (extrication, air, more units). Patient count. Mechanism read.	Hemorrhage and airway in parallel. Partner holds manual stabilization only if SMR may be needed.	Instability? Triage step? Life threats fixed? Say it out loud.	Scoop, board only for extrication, binder, gross splinting, blankets.	Doors closed. Alert from the scene or as you pull away #153.

PITFALL · SCENE IVS

Starting lines on scene is the most common reason trauma scene times drift past ten minutes. The county is explicit: early transport with treatment en route for high-risk or unstable patients #660. The exception is entrapment, where you have time while the fire department cuts.

CHAPTER 5

Secondary Survey, Vitals, and Reassessment

The numbers that move first, and how to catch them moving.

The secondary survey

A head-to-toe exam, a history, and a full set of vitals, done after the life threats are managed and usually in the back of the ambulance. Look, listen, and feel every region: scalp and skull, face, neck (trachea, veins, wounds, midline tenderness), chest (both sides and the back), abdomen (all four quadrants, flanks, seatbelt sign), pelvis (look for deformity, bruising, blood at the meatus; do not rock or spring it #713), extremities (deformity, wounds, pulses, motor, sensation), and back.

HISTORY THAT CHANGES CARE

- **Anticoagulants** (not aspirin) with any head injury: Step 4 consult #153. Get the drug name and the time of the last dose.
- **Age over 65**, **pregnancy over 20 weeks**, **pediatric**: Step 4 considerations #153.
- Beta or calcium channel blockers: the heart rate will lie.
- What happened **before** the trauma: syncope, chest pain, seizure, low sugar, or intoxication may be the real diagnosis.

PEARL · AMPLE IN 30 SECONDS

Allergies, **M**edications (blood thinners first), **P**ast history, **L**ast oral intake (and last menstrual period), **E**vents leading up to it. Ask "Did anything happen right before you fell or crashed?" every time. Ask family or bystanders for the patient's baseline mental status; you cannot score a change you never measured.

Vitals that matter in trauma

MEASURE	WHAT IT TELLS YOU	USE IT LIKE THIS
Heart rate	The first number to move in most bleeding patients	Rising rate with a "normal" pressure is shock until proven otherwise; beta blockers and pacemakers hide it
Blood pressure	A late sign; the body defends it until about a third of blood volume is gone	Manual BP is preferred in unstable trauma #660; cuffs read high when the pressure is low
Shock index (HR ÷ SBP)	Rises before the pressure falls	Over 0.9 to 1.0 suggests significant blood loss PEARL; HR 120 ÷ SBP 110 = 1.1
Pulse pressure	Narrows as stroke volume drops and vessels clamp down	110/90 is worse than 100/60. Tamponade also narrows it
Respiratory rate	Climbs with shock, pain, chest injury, and acidosis	Under 10 or over 29 is Step 1 #153
GCS	Brain perfusion and brain injury	13 or less is Step 1 #153; trend it; score it before sedating
EtCO2	Ventilation, and in a ventilated patient, how much blood the heart is moving	A falling EtCO2 with a steady rate is falling cardiac output until proven otherwise #701
SpO2	Oxygenation, when perfusion is adequate	Unreliable when cold or shocked; carbon monoxide reads falsely normal

THE WHY · COMPENSATED UNTIL IT ISN'T

When blood is lost, the sympathetic nervous system speeds the heart and clamps down the arterioles and veins in the skin, gut, and kidneys. That keeps systolic pressure and brain perfusion near normal while the patient looks pale, cool, anxious, and tachycardic. Young, fit patients and children are very good at this, which is why their pressure stays normal right up until it falls off a cliff. Older patients are worse at it, and medications blunt it further. **Treat the trend, not the snapshot.**

FROM THE DEN Heart rate texts you first. Blood pressure calls after it's already over. Answer the text.

Glasgow Coma Scale

SCORE	EYES	VERBAL (ADULT)	VERBAL (PREVERBAL CHILD)	MOTOR
6				Obeys commands (child: moves spontaneously, purposefully)
5		Oriented	Coos, babbles, interacts	Localizes to pain (child: withdraws to touch)
4	Spontaneous	Confused	Irritable, consolable cry	Withdraws from pain
3	To voice	Inappropriate words	Cries to pain	Abnormal flexion (decorticate)
2	To pain or pressure	Incomprehensible sounds	Moans to pain	Extension (decerebrate)
1	None	None	None	None

PEARL · REPORT THE PARTS

"GCS 9" tells the trauma team less than "E2, V2, M5." The motor score carries most of the prognostic weight; a patient who cannot follow commands (motor under 6) is in the high-risk group of the national field triage guideline. Score the GCS after airway, breathing, and circulation are addressed, and before you give sedating medications when that does not delay care BTF 2023.

Reassessment rhythm

HOW OFTEN

- Unstable: vitals every 5 minutes, manual pressure preferred #660.
- Stable: every 15 minutes, and after every intervention, move, and medication.
- Call out SBP 90 or less **at any time** #660.
- GCS and pupils with every set in head injury.

PITFALL · RE-CHECKING ONLY THE VITALS

Reassessment means repeating the primary survey, not just reading the monitor. Re-listen to both lungs after every move and after bagging starts, recheck the tourniquet and wounds for bleeding, recheck distal pulses after splinting, and look at the patient's face. Tension pneumothorax and re-bleeding love the back of a moving ambulance.

PART

02

Bleeding & Shock

Stop the bleed, read the shock, give what the county gives, and know why less fluid is often more.

6 Hemorrhage Control

7 Hemorrhagic Shock: Reading the Bleed

8 Fluids and Permissive Hypotension

9 Tranexamic Acid (TXA)

10 Other Shock in Trauma

COUNTY DOCUMENTS IN THIS PART #601 · #660 · #706 · #706-A · #710 · #714 · Formulary

★ ★ ★ ★ ★

CHAPTER 6

Hemorrhage Control

Every red cell you keep inside is one the trauma surgeon does not have to replace.

#706 #706-A #660 #660-A

THE RULE · THE COUNTY LADDER #706

1 · DIRECT PRESSURE
Firm, focused, with gauze, on the bleeding point. Not on top of a pile of dressings.

2 · TOURNIQUET
Life-threatening extremity bleeding not controlled by other means. Commercial device from #706-A.

3 · HEMOSTATIC DRESSING
For uncontrolled bleeding after all of the above fail; if bleeding persists over 3 minutes despite other measures, pack it directly into the bleeding site.

ALS · TXA
Significant blood loss with ongoing bleeding not controlled by pressure, hemostatics, or tourniquet: TXA per #714 (age 15 and older).

PEARL · THE LADDER IS NOT A WAITING LINE

The ladder tells you what to reach for, not how long to wait at each rung. A femoral wound pumping bright red blood or a traumatic amputation goes straight to the tourniquet. Practically every civilian tourniquet study since 2015 says the same thing: tourniquets placed early, before shock, save lives; tourniquets placed after the patient is pale and quiet often do not. The county's own indication is bleeding "that cannot be controlled by other means" #706, and in the face of arterial bleeding from a limb, your hands are not the other means.

Tourniquets the county approves #706-A

TOURNIQUETS	HEMOSTATIC DRESSINGS
Combat Application Tourniquet (C-A-T)	QuikClot Combat Gauze LE; QuikClot EMS rolled gauze, 4×4, TraumaPad
SOF Tactical Tourniquet (SOFT)	Celox Gauze Z-fold; Celox Rapid Z-fold
Mechanical Advantage Tourniquet (MAT)	HemCon ChitoFlex Pro
Tourni-Kwik 4 (TK4)	**Not authorized:** granules or granules in an applicator

PITFALL · IMPROVISED TOURNIQUETS

Belts, cravats, and shoelaces rarely generate enough pressure to occlude an artery; they often occlude only the veins, which **increases** bleeding. Once an approved tourniquet is on and working, remove the improvised one #706.

Tourniquet application, the county way

1. **Look first.** Inspect the limb. Avoid placing the strap over a joint, an angulated or open fracture, or the wound itself #706.
2. **Check and document** circulation, motor, and sensation distal to the injury if you can do it in seconds.
3. **Place it 2 to 4 inches proximal to the wound** per the manufacturer #706. If you cannot find the wound (dark, soaked clothing, chaos), go high and tight on the limb and readjust when you can see.
4. **Tighten rapidly** to the least pressure that stops the bleeding and/or makes the distal pulse go away. It will hurt. That is how you know it is tight enough.
5. **Cover the wound, never the tourniquet.** Keep it visible #706.
6. **Write the time on the device** and tell the receiving staff the time of placement #706.
7. **Reassess** for bleeding distal to the tourniquet after every move. Thigh tourniquets on large patients often need a second tourniquet placed just above the first.

FROM THE DEN It's supposed to hurt. "Ow" is a reassessment finding, and it means the tourniquet is working. Then write the time on the device, because the surgeon can't read your mind, and at 0300 neither can you.

BASE · TOURNIQUET REMOVAL BASE

ALS may remove a tourniquet only with base consult, when it was placed inappropriately or is no longer needed. Procedure: IV access, ECG monitoring, firm pressure over the wound for at least 5 minutes, then **slowly** release while watching for re-bleeding, document the time, bandage, and reassess distal circulation #706. If the patient is in shock, or the tourniquet has been on for a long time, the answer is almost always to leave it.

THE WHY · TIME LIMITS

Arterial tourniquets are generally well tolerated for about two hours; nerve and muscle injury risk rises after that. Most SLO transports are well under that window. Pain, not tissue damage, is the main problem: treat it #603. The time written on the device matters most to the surgeon deciding how fast to revascularize.

Junctional and torso bleeding

Neck, axilla, groin, and buttock wounds cannot take a limb tourniquet, and the county lists junctional locations where a tourniquet is impractical as a contraindication #706. The answer is **wound packing plus pressure**:

1. Find the bleeding vessel by opening the wound and removing clot you can reach.
2. Pack hemostatic gauze (or plain gauze if that is what you have) **tightly** into the cavity, directly onto the bleeding point, with fingertips, until no more fits.
3. Hold firm pressure for at least 3 minutes (most manufacturers say 3; many surgeons say longer), then a pressure dressing #706.
4. If it soaks through, do not peel it off. Add pressure and consider a second pack only if the first is clearly not seated.

PITFALL · THE NECK

Do not pack deep into the neck blindly, do not compress both sides of the neck, and do not apply a circumferential dressing. Hold direct pressure. For an open neck vein wound, an occlusive dressing reduces the risk of air entering the venous system PEARL. Never pack the chest or abdomen.

EVIDENCE

In a multicenter review of 1,026 civilian peripheral vascular injuries at eleven Level I centers, prehospital tourniquet use was independently associated with roughly six-fold higher odds of survival, without an increase in delayed amputation. The 2023 joint position statement from ACS-COT, ACEP, NAEMSP, and NAEMT on prehospital hemorrhage control endorses early tourniquets, wound packing for junctional wounds, and deliberate (not casual) tourniquet conversion. Teixeira 2018 Berry 2023

Bleeding you cannot see

APPROXIMATE BLOOD LOSS WITH CLOSED FRACTURES (ADULT)

INJURY	POSSIBLE LOSS	INJURY	POSSIBLE LOSS
Rib (each)	about 125 mL	Tibia or fibula	500 to 1,000 mL
Radius or ulna	250 to 500 mL	Femur	1,000 to 2,000 mL
Humerus	500 to 750 mL	Pelvis	1,000 mL to the entire blood volume

Teaching values used in prehospital trauma courses; they illustrate scale, not a precise count. Blood also hides in the chest (each hemithorax holds about 3 liters), the abdomen, the retroperitoneum, and "on the floor and the street."

CHAPTER 7

Hemorrhagic Shock: Reading the Bleed

Shock is a perfusion problem, not a blood pressure number.

#601-A #660 #153

Shock is inadequate delivery of oxygen to the tissues. In trauma it is hemorrhage until proven otherwise, but you must also keep tension pneumothorax, tamponade, and spinal cord injury in the differential, because each is treated differently (Chapter 10).

The classes of hemorrhage ATLS TEACHING

CLASS	BLOOD LOST (70 KG ADULT, ABOUT 5 L TOTAL)	HEART RATE	BLOOD PRESSURE	PULSE PRESSURE	MENTAL STATUS
I	Up to 15% · up to 750 mL	Normal or slightly up	Normal	Normal	Slightly anxious
II	15 to 30% · 750 to 1,500 mL	Up	Normal	Narrowed	Anxious
III	30 to 40% · 1,500 to 2,000 mL	Clearly up	Normal or falling	Narrowed	Confused
IV	Over 40% · over 2,000 mL	Very fast, or slowing near death	Low	Narrow	Lethargic, unresponsive

THE WHY · THE BLOOD PRESSURE LIES LATE

A healthy adult can lose 30% of blood volume before systolic pressure falls. That is about 1,500 mL in a 70 kg adult: the volume in a full femur fracture plus a moderate spleen injury. By the time the cuff reads under 90, the patient has entered Class III and has much less reserve than the number suggests. This is why the county triggers on **SBP 90 or less, or no palpable peripheral pulses** #660, and why a fast heart rate in an injured patient deserves respect even when the cuff is happy.

PEARL · FAST CLUES TO SHOCK

- Pale, cool, clammy skin and delayed capillary refill
- Anxiety or restlessness: the brain noticing low flow before the cuff does
- Thirst, nausea, air hunger
- Radial pulse weak or absent while carotid is present
- Shock index over 1 (HR higher than SBP)
- Narrow pulse pressure on serial vitals
- EtCO2 falling with a steady respiratory rate

Who hides shock

PATIENT	WHAT CHANGES	DO THIS
Young, fit adults	Compensate hard; may look fine until sudden collapse	Trust heart rate, skin, and mechanism
Children	Pressure is the last thing to fall; tachycardia and poor perfusion come first	Use #601-A age-based values; cap refill and mental status matter more than the cuff (Chapter 21)
Older adults	Normal for them may be 150 systolic; beta blockers blunt tachycardia	SBP under 110 over age 65 may represent shock #153
Pregnant patients	Blood volume up 40 to 50%; can lose a third before signs; the fetus shows distress first	Left lateral positioning; treat early (Chapter 23)
Athletes, pacemakers, beta blockers	Resting rate low or fixed	A "normal" 90 may be tachycardia for them

FROM THE DEN Kids are tiny hemodynamic poker players: perfect face, perfect pressure, right up until they're all in. Watch the heart rate and the skin, not the cuff.

PITFALL · WAITING FOR THE PRESSURE

The most expensive sentence in trauma is "pressure's still okay." By the time it is not okay, the patient has lost a third of their blood. Decide on the destination and the triage step from the whole picture (mechanism, anatomy, skin, heart rate, mental status), not from the cuff alone.

CHAPTER 8

Fluids and Permissive Hypotension

Saline does not carry oxygen and does not clot. Give what the county allows, and no more than the patient needs.

#601 #660 #710 #661

THE RULE #660

	ADULT	PEDIATRIC (34 KG OR LESS)
Trigger	SBP 90 or less, or unable to palpate peripheral pulses	Hypotension for age (#601-A)
Fluid	Normal saline up to 500 mL IV	Normal saline 20 mL/kg IV/IO, not to exceed 500 mL
Repeat	May repeat once for ongoing hypotension	May repeat once if no change in SBP
Beyond that	Additional normal saline BASE	
Access	Large bore (18 G or larger) with a saline lock to make tubing changes easy at the trauma center #660; IO when indicated #710	

Why less is more

THE WHY

- **Popping the clot.** The first clot at an injured vessel is fragile. Pushing pressure up can blow it off and restart bleeding.
- **Dilution.** Saline thins clotting factors, platelets, and red cells, and the patient bleeds thinner blood.
- **Cold and acid.** Room-temperature fluid cools the patient; large volumes of saline add a chloride (acid) load.
- **Leaky lungs and swollen tissue.** Much of each liter leaves the vessels within an hour.

EVIDENCE

The classic Houston trial of penetrating torso trauma found better survival when fluid was delayed until the operating room Bickell 1994. The 2024 NAEMSP Trauma Compendium position statement on fluid resuscitation recommends isotonic crystalloid when fluids are used, calls permissive hypotension reasonable in patients **without** traumatic brain injury, says that avoiding or correcting hypotension may matter more than restricting fluid when TBI is present, and advises against large-volume crystalloid NAEMSP 2024.

What "permissive" means in practice

Permissive hypotension means you do not chase a normal blood pressure with fluid in a patient who is still bleeding inside. You give the county's bolus to restore perfusion (a palpable radial pulse, better mentation) when the trigger is met, and you let the surgeon fix the leak. The county's limits, 500 mL with one repeat for adults and 20 mL/kg with one repeat for children #660, are built around exactly that idea.

SITUATION	APPROACH
Penetrating torso, hypotensive, mentating	Bolus to the trigger per #660, then reassess. A radial pulse and a talking patient are the goal, not 120 systolic
Blunt multisystem trauma	Same. Splint the pelvis if indicated #713, TXA if indicated #714, warm the patient
Head injury plus hypotension	**No permissive hypotension.** A single episode of hypotension worsens TBI outcome. Treat at the trigger without hesitation and reassess every 5 minutes; ask base for more if the pressure keeps sagging (Chapter 14)
Older adult, SBP 100 to 110	May already be in shock #153. Not a fluid trigger by itself, but it changes your destination thinking and your vigilance
Normotensive, tachycardic, pale	Line in, bag spiked and primed, ready to go. No bolus unless a trigger is met

PEARL · ACCESS THAT WORKS

- Two large-bore lines in the antecubital fossae are the trauma standard; a saline lock on one makes the trauma bay's life easier #660.
- The county prefers peripheral IV, including the external jugular, over IO, but you may go straight to IO when access looks difficult in a patient in extremis, or place an IO after one failed IV attempt. Keep trying for an IV after the IO is in #710.
- IO sites: tibial plateau, humeral head, medial malleolus. Avoid an injured limb and any limb with a proximal fracture PEARL.
- Responsive to pain after IO: lidocaine 0.5 mg/kg (max 40 mg) slow IO over 60 seconds #710.

PITFALL · THE WIDE-OPEN BAG

A wide-open liter in a bleeding patient is not "aggressive care"; it is a liter of cold water in someone who needs blood. Run the bolus you intend, close the roller clamp, and reassess. Warm the patient compartment, and use warmed fluid if your agency carries it. Say out loud how much has gone in.

FROM THE DEN Normal saline is neither normal nor what they lost. They lost blood, and saline is a cold, thin impression of it. Give the county bolus, reassess, and get them to the people with the real thing. The one place permissive hypotension never gets through the door is the head.

WHERE TRAUMA CARE IS HEADING · PREHOSPITAL BLOOD

Several US systems now carry whole blood or plasma on ambulances, aircraft, or supervisor units, and the 2025 NAEMSP Trauma Compendium includes a position statement on prehospital transfusion. Blood carries oxygen and clots; saline does neither. It is not SLO County ground ambulance scope today, but Policy #155 lists blood as one of the reasons to request a helicopter, because some flight crews carry it. Knowing why it is coming will help you understand why the trauma team cares so much about how much saline you gave. NAEMSP 2025

CHAPTER 9

Tranexamic Acid (TXA)

It does not stop bleeding from a hole. It protects the clot you already have.

#714 #660 #706 Formulary

THE RULE · INDICATIONS #714

Adults 15 years and older, with either:

- Blunt or penetrating traumatic injury with **SBP 90 or less**, or
- Significant blood loss with ongoing bleeding **not controlled** by direct pressure, hemostatic agents, or tourniquet.

Dose: TXA 1 g in 100 mL normal saline IV/IO infused over 10 minutes. **No repeat.** Concentration 10 mg/mL. Label the bag ("TXA 1 g in 100 mL").

The formulary adds: rate not to exceed 100 mg/min (so 100 mL over no less than 10 minutes). No pediatric dose.

CONTRAINDICATIONS #714

- More than **3 hours** since injury
- Age **under 15**
- **Isolated head injury**
- Isolated spinal shock
- Non-blood-loss conditions
- Isolated extremity hemorrhage when bleeding is controlled and reimplantation is strongly expected
- Traumatic arrest with more than 5 minutes of CPR without ROSC
- Drowning or hanging
- Active thromboembolic event within 24 hours (stroke, MI, PE, DVT)
- Hypersensitivity or anaphylaxis to TXA

Formulary precautions: severe kidney disease, pregnancy.

THE WHY · HOW IT WORKS

When you bleed, your body forms a fibrin clot and at the same time starts breaking clots down (fibrinolysis) using plasmin. Severe trauma kicks fibrinolysis into overdrive, so clots dissolve faster than they form. TXA blocks the conversion of plasminogen to plasmin, which protects the clots the body is making. That is why it helps **early** and helps in **shock**, and why it does nothing for a wound you have not mechanically controlled. Pressure and tourniquets first; TXA after lifesaving interventions, en route.

The evidence, honestly

STUDY	WHAT IT SHOWED
CRASH-2 (2010)	About 20,000 bleeding trauma patients in 40 countries: TXA within 3 hours modestly reduced death from bleeding. Given after 3 hours, it appeared harmful. This is the origin of the 3-hour limit.
PATCH-Trauma (2023)	Prehospital TXA in advanced trauma systems (Australia, New Zealand, Germany) **lowered 24-hour mortality** (9.7% vs 14.1%) but did not increase survival with good function at 6 months (53.7% vs 53.5%).
NAEMSP, ACEP, ACS-COT (2025)	Prehospital TXA may reduce mortality in adults with hemorrhagic shock when given after lifesaving interventions; appears safe; should be given for clinical signs of hemorrhagic shock and no later than 3 hours after injury. Optimal dose, rate, and route are not settled, and pediatric use is not established.

References in Appendix D. The point for the field: TXA is a reasonable, protocolized adjunct for the bleeding, shocked adult. It is not a substitute for hemorrhage control or speed.

PEARL · GETTING IT RIGHT

- Know the **time of injury**. If you cannot establish it within 3 hours, you cannot give it.
- Mix in a 100 mL bag; a 10 drop/mL macro set at about 1.7 drops per second gives 100 mL in 10 minutes. Use a pump if your agency has one.
- Give it en route, after bleeding control, airway, and decompression.
- Tell the receiving team the **time it started**. Hospitals often give a second gram as an infusion; they need your time to dose it and to avoid doubling the bolus.

PITFALL · THE WRONG PATIENT

- The anticoagulated older adult who fell and has only a head bleed: **isolated head injury** is a contraindication **#714**.
- The patient who was in arrest for 8 minutes before ROSC: contraindicated.
- The 14-year-old: no pediatric dose in this county.
- Pushing it fast: rapid infusion causes hypotension. Ten minutes, every time.

FROM THE DEN TXA is the clot's bodyguard, not its contractor. It can't protect a clot you never let form, so pressure and tourniquets come first. And it expires three hours after the injury, so write that time down.

CHAPTER 10

Other Shock in Trauma

Not every hypotensive trauma patient is bleeding. The other three kinds of shock need different hands.

#660 #705 #702 Formulary

TYPE	TRAUMA CAUSES	HOW IT LOOKS	FIELD FIX
Hypovolemic	Bleeding; large burns (hours later)	Tachycardic, pale, cool, flat neck veins	Stop bleeding, limited fluid, TXA, go #660 #714
Obstructive	Tension pneumothorax; cardiac tamponade	Hypotension with distended neck veins (unless also bleeding); tension: absent breath sounds one side, rising airway pressure; tamponade: muffled tones, narrow pulse pressure	Tension: needle decompression #705. Tamponade: fluid may buy minutes; rapid transport to a surgeon
Distributive (neurogenic)	Cervical or high thoracic cord injury (usually T6 or above)	Hypotension with a **normal or slow** heart rate; warm, dry, pink skin below the injury; priapism; paralysis	SMR #702, fluids per #660, push-dose epinephrine or epi drip BASE
Cardiogenic	Blunt cardiac injury (steering wheel, falls onto the chest); a medical MI that caused the crash	Dysrhythmias, new ECG changes, wet lungs, hypotension out of proportion to bleeding	Monitor, 12-lead if a cardiac event is suspected #707, treat rhythms by protocol

Neurogenic shock and push-dose epinephrine

BASE ORDERS · NEUROGENIC SHOCK REFRACTORY TO FLUIDS #660

Push-dose epinephrine 10 mcg/mL: 1 mL IV/IO every 1 to 3 minutes, titrated to SBP over 90. Pediatric: 1 mL (0.1 mL/kg if under 10 kg) to age-appropriate SBP.

Mix: 9 mL normal saline + 1 mL epinephrine 1:10,000 (0.1 mg/mL) in a 10 mL syringe = 10 mcg/mL. Label it.

Or epinephrine drip 1 mcg/mL (1 mg in 1 L NS), starting at 10 mcg/min for extended transport and titrating down to the lowest rate that keeps SBP over 90; pediatric 1 mcg/kg, not to exceed 10 mcg/min, per the formulary drip chart.

The formulary lists push-dose and drip epinephrine as base station orders. Correct volume first: fluids always come before pressors.

THE WHY · WARM AND SLOW

The sympathetic chain runs down the thoracic spinal cord. A high cord injury cuts the signal that tightens vessels and speeds the heart, so the vessels dilate (warm, pink skin, low pressure) and the vagus nerve is left unopposed (slow heart). Bleeding patients are cold and fast; neurogenic patients are warm and slow. **Spinal shock** is a different thing: the temporary loss of reflexes and tone below an injury, not a blood pressure problem.

FROM THE DEN

Bleeding is cold and fast. Neurogenic is warm and slow. Warm and fast usually means they're just mad at you. Check the pelvis anyway.

PITFALL · CALLING IT NEUROGENIC TOO EARLY

Neurogenic shock is a diagnosis of exclusion in the field. A paralyzed patient can also be bleeding from a pelvis, spleen, or femur, and their skin and heart rate may not warn you because the injury blocked the sympathetic response. Assume hemorrhage first, look hard for it, and only then call it neurogenic.

Tension and tamponade, side by side

FINDING	TENSION PNEUMOTHORAX	CARDIAC TAMPONADE
Mechanism	Blunt or penetrating chest; positive-pressure ventilation; barotrauma	Penetrating "cardiac box" wound (between the nipples, clavicles to costal margin), less often blunt
Breath sounds	Absent or decreased on one side	Usually equal
Neck veins	Distended (may be flat if also bleeding)	Distended (Beck's triad: hypotension, JVD, muffled heart sounds)
Percussion	Hyperresonant on the affected side	Normal
Monitor	Tachycardia, then bradycardia and PEA	Low voltage, electrical alternans, PEA
Fix	Needle thoracostomy #705	Surgeon: rapid transport, notify early

PART

03

Airway & Chest

Oxygenate without hurting them, find the tension before it finds you, and fix the holes you can fix.

11 The Trauma Airway

12 Chest Trauma

13 Capnography in Trauma

COUNTY DOCUMENTS IN THIS PART #602 · #660-A · #701 · #703 · #704 · #705 · #717 · #718



★ ★ ★ ★ ★

CHAPTER 11

The Trauma Airway

Oxygenate and ventilate. A tube is one way to do that, not the goal itself.

#602 #703 #704 #717 #718 #701

THE RULE #602

- O2 to keep SpO2 at 94% or higher with the simplest method; do not withhold it in distress. No O2 for SpO2 94% or higher without signs of hypoxia or respiratory compromise.
- Basic adjuncts and suction as indicated and tolerated; SGA as indicated #718.
- Foreign body not relieved by BLS maneuvers: visualize and remove with Magill forceps; if it persists, needle cricothyrotomy #704.
- ETI or SGA by provider discretion #717 #718.
- Confirm every advanced airway with **waveform capnography plus one other method** (auscultation of lungs and stomach, colorimetric CO2, or esophageal bulb) #602.
- BVM at 15 L/min; CPAP 3 to 15 cm H2O for respiratory distress in patients over 34 kg, but **not in major facial, head, or chest trauma**, with signs of pneumothorax, or with SBP under 90; notify base when it is used #703.

The ladder, from simple to surgical

STEP	TRAUMA-SPECIFIC TECHNIQUE
Position	Jaw thrust without head extension when spinal injury is suspected, with manual in-line stabilization by a second provider. If the jaw thrust cannot hold the airway, use a head-tilt chin-lift: the airway wins #717. Sit up or turn the patient who is bleeding into the airway and can protect it, if the spine allows.
Suction	Rigid tip, large bore, early and often. Blood and vomit cause more airway deaths in trauma than tongues.
OPA / NPA	OPA if no gag. NPA is useful in the clenched patient but avoid it with suspected basilar skull fracture or severe midface injury PEARL.
BVM	Two-person, two-hand mask seal. Small volumes (just enough for chest rise), slow rate. A PEEP valve helps oxygenation.
SGA	Fast and does not require a view; does not protect fully against aspiration of blood. i-Gel sizes run from 2 (10 to 25 kg) and 2.5 (25 to 35 kg) to 3 (30 to 60 kg), 4 (50 to 90 kg), and 5 (over 90 kg), so it is the advanced airway for children too. Not with a gag reflex, caustic ingestion, or known esophageal disease. Suction intermittently and never past the tip of the device. Once placed, do not pull it for a tube #718 #641.
ETI	Over 34 kg; not with an intact gag reflex. Ears in line with the sternal notch, 100% oxygen, and a nasal cannula left on for apneic oxygenation during the attempt. Visualize the cords in 10 seconds or less; video laryngoscopy and bougie when available. After a failed first attempt, oxygenate, reposition, and consider an SGA; after a second failure, go to the SGA. EtCO2 under 10 after placement: pull the tube and oxygenate before another attempt #717. Secure without compressing the front or sides of the neck.
Needle cric	Upper airway obstruction not relieved by conventional maneuvers: fractured larynx, massive facial trauma, facial burns with airway involvement, laryngeal edema #704.

PEARL · OXYGENATE BEFORE YOU INTUBATE

The trauma patient who desaturates during intubation, then becomes hypotensive after the tube, has had two secondary insults in two minutes. Preoxygenate with a nonrebreather plus a nasal cannula, or BVM with PEEP, until the SpO2 is as high as you can get it. Have a plan for the drop in pressure that often follows positive-pressure ventilation in a bleeding patient: positive pressure reduces blood returning to the heart. Ask yourself whether the tube needs to happen in the field at all.

PITFALL · BAGGING TOO HARD AND TOO FAST

Overventilation is the most common airway error in trauma. It raises chest pressure (less blood back to the heart), fills the stomach (vomiting, aspiration), and drops CO2 (the brain's vessels constrict). In TBI that is a direct secondary injury. About 10 breaths per minute for adults, watch the chest rise, and use the EtCO2 waveform to target 35 to 45 mmHg BTF 2023.

FROM THE DEN Bagging at thirty a minute doesn't make the patient feel better. It makes you feel better, and you are not the patient. Ten a minute. Count it out loud if you have to.

Needle cricothyrotomy #704

1. Supine. Identify the cricothyroid membrane between the thyroid and cricoid cartilages; prep with povidone-iodine and alcohol.
2. Stabilize the trachea with your non-dominant hand.
3. Insert a large-bore IV catheter (**maximum 10 Ga**) with a syringe attached, at **45° toward the feet**, aspirating as you go. Air return means you are in the trachea.
4. Withdraw the needle, attach a cut 3 mm ET tube adapter, and ventilate with a BVM (or use a county-allowed commercial device per manufacturer).
5. Secure, hold it manually through transport, and reassess lung sounds. If complications occur, remove and repeat #704.

THE WHY · OXYGENATION, NOT VENTILATION

A needle cric moves oxygen in but lets very little CO2 out, because the catheter is so narrow and exhalation is passive through the upper airway. It is a bridge measured in minutes. Rapid transport with early notification is part of the procedure #704. Watch for subcutaneous emphysema (catheter out of the trachea) and for rising chest pressure if the upper airway is completely blocked.

Special trauma airways

FACIAL TRAUMA

Blood, broken teeth, and a mobile midface. Sit them up and forward if spine permits; aggressive suction; two-hand BVM may be impossible. A conscious patient often protects their airway best in the position they chose.

NECK TRAUMA

Expanding hematoma, stridor, voice change, or subcutaneous air means the airway may close. Notify early. A penetrating neck wound gets SMR only if there is a neurologic deficit #702.

BURNED AIRWAY

Soot, singed nasal hair, carbonaceous sputum, stridor, hoarseness: swelling is progressive and unpredictable. ETI is the gold standard for burn airway management #633 (Chapter 25).

CHAPTER 12

Chest Trauma

Six injuries kill in minutes. You can fix two of them with what is in your bag.

#705 #660-A #703 #153 #661

Tension pneumothorax

THE WHY

Air enters the pleural space through a one-way leak and cannot get out. Pressure builds with every breath, collapses the lung, shifts the mediastinum, and kinks the great veins so blood cannot return to the heart. The patient dies of obstructive shock, not of hypoxia alone. Patients on positive pressure (BVM, tube) develop it faster and more dramatically.

THE RULE · SIGNS #705

- Deteriorating respiratory status
- Falling SBP, rising pulse
- Diminished breath sounds on the affected side
- Jugular vein distension
- Hyperresonance on the affected side
- Tracheal shift away (late, hard to see)
- Increasing resistance to ventilation (BVM or tube)

THE RULE · NEEDLE THORACOSTOMY #705

Indications: tension pneumothorax with significant respiratory compromise; traumatic cardiac arrest with suspected chest trauma (bilateral) #661.

Site: 2nd intercostal space, midclavicular line, **or** 4th intercostal space, midaxillary line, on the affected side.

Equipment: large IV catheter 10 to 12 Ga (**maximum 10 Ga**), syringe, one-way valve (such as an Asherman seal), antiseptic.

1. Prep the site with povidone-iodine and alcohol.
2. Syringe attached, insert at **90°** just over the **top** of the rib.
3. Feel the loss of resistance; air and/or blood returns.
4. Advance the catheter, remove the needle, let pressure out.
5. Secure the catheter; attach a one-way valve. Reassess lung sounds.

PEARL · WHY OVER THE TOP OF THE RIB

The intercostal artery, vein, and nerve run in a groove along the **bottom** of each rib. Going over the top of the rib below your target space keeps you away from them. Second space: find the angle of Louis (the bump where the manubrium meets the sternum); the 2nd rib attaches there, and the space is just below it. Stay lateral to the nipple line to avoid the heart and great vessels.

EVIDENCE · FAILURE IS COMMON

Needle decompression fails more often than most providers think, mainly because the catheter does not reach the pleura in thicker chest walls, and because catheters kink. A widely cited meta-analysis found the 4th/5th space at the anterior axillary line had the thinnest chest wall and lowest predicted failure; other studies favor the 2nd space in obese patients. Longer catheters (about 8 cm) succeed more often. The NAEMSP 2024 pneumothorax statement and current reviews support either site with an adequate-length device. Laan 2016 Aho 2016 NAEMSP 2024

FROM THE DEN Go over the top of the rib. The artery, vein, and nerve live in the basement under each rib, and they do not like visitors.

PITFALL · DECOMPRESSED, THEN FORGOTTEN

- A catheter that worked can kink, clot, or dislodge. If signs return, reassess and decompress again per #705.
- No rush of air does not mean no tension; it may mean you did not reach the pleural space.
- Decompression is not indicated by low SpO2 alone, by an isolated diminished breath sound in a stable patient, or empirically in a traumatic arrest without suspected chest trauma NAEMSP 2025.

The rest of the deadly chest

INJURY	RECOGNIZE	DO
Open pneumothorax ("sucking chest wound")	Hole in the chest wall, bubbling or sucking with breathing; the patient air-hungry	Chest seal or occlusive dressing; for multiple wounds, seal them all #660-A. Watch for a tension developing under the seal and "burp" the dressing or decompress
Flail chest	Two or more ribs broken in two or more places; a segment moves in when they breathe in (paradoxical motion); crepitus	Support the flail segment and monitor respirations #660-A. Step 2 alert: chest wall instability or deformity #153. The real problem is the bruised lung underneath; oxygen, pain control, assisted ventilation if failing
Massive hemothorax	Shock with decreased breath sounds and **dull** percussion on one side; neck veins often flat	Oxygen, limited fluid, TXA if indicated, rapid transport. Needle decompression does not help blood
Cardiac tamponade	Penetrating wound in the cardiac box, Beck's triad, PEA	Rapid transport to the closest trauma center; alert early; fluids may temporize
Blunt cardiac injury	Steering wheel or sternal impact; dysrhythmias, unexplained tachycardia, hypotension	Monitor continuously; 12-lead if a cardiac event is suspected #707
Aortic injury	High-speed deceleration; may have few signs; unequal arm pressures or pulses	High suspicion, gentle handling, avoid hypertension, rapid transport
Pulmonary contusion	Hypoxia that worsens over hours after blunt chest impact	Oxygen, careful fluids, watch the trend
Rib fractures	Point tenderness, splinting, shallow breathing	Pain control is lung protection: a patient who cannot breathe deeply gets pneumonia #603
Traumatic asphyxia	Crush to the chest: purple face and neck, petechiae, eye hemorrhages	Support breathing; look for associated chest injuries

PEARL · COMMOTIO CORDIS

A blow to the chest during the vulnerable moment of the cardiac cycle (a baseball, a hockey puck, a fist) can cause ventricular fibrillation in a young person with a normal heart. It is a medical arrest with a trauma cause: start CPR and defibrillate. The traumatic arrest protocol is for arrests caused by blood loss, hypoxia, or obstruction #661.

CHAPTER 13

Capnography in Trauma

The most underused perfusion monitor on the ambulance.

#701 #602 #641

EtCO2 reflects three things at once: how much the patient is breathing, how much blood is reaching the lungs, and how much CO2 the body is making. In a trauma patient whose ventilation you are controlling (BVM or tube), changes in EtCO2 mostly reflect changes in **perfusion**.

READING	IN TRAUMA, THINK	ACTION
35 to 45, square wave	Normal ventilation and perfusion	Target range in TBI BTF 2023
Falling, steady rate, good waveform	Cardiac output dropping: bleeding, tension, tamponade	Reassess circulation, chest, and bleeding now
Under 35 from bagging too fast	Hyperventilation: brain vessels constrict	Slow down; about 10 per minute for adults
Over 45, slow rate	Hypoventilation: head injury, opioids, chest injury, fatigue	Assist ventilations
Sudden loss of waveform	Tube dislodged, disconnected, obstructed, or circulation lost	Look at the patient, then the circuit (DOPE: displacement, obstruction, pneumothorax, equipment)
Under 10 during CPR	Poor compressions or no effective circulation	Fix CPR quality; in traumatic arrest, fix HOTT causes (Chapter 28)
Sudden rise during CPR	Possible ROSC	Check at the next pulse check

THE RULE #701

- Use waveform capnography to confirm and monitor every advanced airway #602.
- Use side-stream or in-line EtCO2 on non-intubated patients in respiratory distress.
- Document numeric values and waveforms: after 1 minute, at intervals for trends, and on ED arrival; for intubated patients, again after moving them to the hospital bed.

PEARL · CAPNOGRAPHY AS A SHOCK ALARM

Put a nasal cannula EtCO2 line on every significant trauma patient, not just the intubated ones. A breathing, talking patient whose EtCO2 drifts from 36 to 28 while their rate stays the same is losing cardiac output. You may see that trend before the blood pressure moves.

FROM THE DEN Capnography is the snitch of the ambulance. It tattles on your ventilation rate, your CPR, and your patient's cardiac output, all on one screen. Listen to the snitch.

PART

04

Head, Spine & Face

Protect the brain from the second hit, restrict spinal motion only when it helps, and handle the face and neck.

14 Traumatic Brain Injury

15 Spinal Injury and Spinal Motion Restriction

16 Face, Eyes, Teeth, and Neck

COUNTY DOCUMENTS IN THIS PART #153 · #603 · #660-A · #702 · #704 · #714



★ ★ ★ ★ ★

CHAPTER 14

Traumatic Brain Injury

You cannot fix the bruise. You can stop the second hit, and that is where outcomes are decided.

#601-A #602 #603 #153 #714 #701

THE WHY · PRESSURE IN A CLOSED BOX

The skull is a rigid box holding brain, blood, and cerebrospinal fluid. When a bleed or swelling adds volume, something else must leave or the pressure inside (ICP) rises. Brain blood flow depends on the gap between the blood pressure pushing in and the ICP pushing back: **cerebral perfusion pressure = mean arterial pressure minus ICP**. So an injured brain with high ICP needs **more** blood pressure, not less, and it needs oxygen in that blood. Low CO2 (from bagging too fast) constricts brain arteries and cuts flow further. That is the entire logic of field TBI care in four sentences.

The three numbers SECONDARY INJURY

OXYGEN

County: SpO2 94% or higher with the simplest method #602.
Evidence: hypoxemia under 90% is a secondary insult; correct it immediately with positioning, oxygen, and then ventilation BTF 2023.

PRESSURE

County fluid trigger: SBP 90 or less #660.
Evidence: monitor for SBP under 100 as hypotension in TBI; IV fluids should treat hypotension and keep it as brief as possible BTF 2023. No permissive hypotension when the head is hurt NAEMSP 2024.

CO2

County: monitor EtCO2 with waveform #701.
Evidence: target EtCO2 35 to 45 with about 10 breaths per minute for adults; avoid hyperventilation (EtCO2 under 35) unless there are signs of active herniation BTF 2023.

EVIDENCE · WHY IT MATTERS THIS MUCH

A single episode of hypotension in severe TBI has long been associated with roughly double the mortality Chesnut 1993. Arizona's statewide EPIC project trained EMS agencies to avoid hypoxia, hypotension, and hyperventilation, and documented improved survival in moderate and severe TBI after implementation; the Brain Trauma Foundation's 3rd edition prehospital guidelines (2023) strengthened many recommendations based on that evidence Spaite 2019 BTF 2023.

FROM THE DEN The injured brain wants three things: oxygen, blood pressure, and for you to stop hyperventilating it. It is needier than a probie on their first shift, and it remembers every time you let it down.

Recognize it

SEVERITY	GCS	FIELD MEANING
Mild	13 to 15	Most head injuries. GCS 13 is still a Step 1 alert #153
Moderate	9 to 12	Can deteriorate fast; airway watch
Severe	8 or less	Cannot protect the airway reliably; establish an airway by the most appropriate means if GCS under 9 or worsening, or hypoxia persists BTF 2023

Bleeds you will see

- **Epidural:** arterial, temporal blow, often a lucid interval then rapid decline, blown pupil on the side of the bleed.
- **Subdural:** venous, older or anticoagulated patients, low-energy falls, slow fluctuating confusion over hours to days.
- **Subarachnoid and contusions:** headache, vomiting, seizure, agitation.
- **Diffuse axonal injury:** high-speed deceleration, deep coma with a normal-looking scan early.

SIGNS OF HERNIATION · ACT NOW

- One pupil dilated and sluggish or fixed
- Extensor (decerebrate) or asymmetric posturing
- A falling GCS, especially a drop of 2 or more points
- **Cushing's triad:** rising blood pressure, falling heart rate, irregular breathing

Only with these signs is brief, controlled hyperventilation to an **EtCO2 of 30 to 35** reasonable as a bridge, with early notification BTF 2023. Do not drop below 30. This is evidence-based guidance, not a county standing order; use your capnography and tell the receiving physician.

Treat it

1. **Airway and oxygen** first, with spine precautions as indicated #702. Suction vomit early; head-injured patients vomit.
2. **Ventilation** with EtCO2 35 to 45. If you are bagging, count out loud or use a metronome.
3. **Blood pressure:** treat hypotension per #660 without hesitation. In polytrauma with TBI, avoiding hypotension outranks fluid restriction.
4. **Elevate the head** about 30 degrees if spine and blood pressure allow (reverse Trendelenburg on the cot keeps the spine in line) PEARL.
5. **Glucose** if altered; hypoglycemia mimics and worsens head injury #612.
6. **Seizures:** midazolam per #620; watch the airway and the pressure afterward. The formulary lists shock with depressed vital signs as a relative contraindication.
7. **Agitation:** hypoxia, pain, a full bladder, and low pressure cause agitation; treat causes before sedating. Severe agitation per #613, with capnography.
8. **Keep them normothermic** (about 36 to 37 °C).
9. **GCS and pupils** every reassessment; report the components and any change.

MEDICATIONS AND THE HEAD #603 #714

- **TXA:** isolated head injury is a contraindication #714. A head injury **plus** hemorrhagic shock from other injuries may still qualify.
- **Ketamine:** the county lists multisystem trauma with head, thoracic, or abdominal injuries as an indication for ketamine analgesia #603. The old fear that ketamine raises ICP has not held up in modern studies.
- **Fentanyl:** formulary precaution in head injury with possible raised ICP; contraindicated with SBP under 90, hypoxia, or impaired respiration #603. Base order with altered LOC.

DESTINATION #153

- GCS 13 or less from injury: Step 1 alert.
- Open or depressed skull fracture, paralysis: Step 2 alert.
- Anticoagulant (not aspirin) or bleeding disorder with a head injury that is not minor: Step 4 consult.
- Ground-level fall with GCS 14 or more (or normal for the patient): no consult required, but still assess and transport appropriately.
- Children with suspected TBI benefit from pediatric-capable trauma care BTF 2023; the SLO trauma center consult is how you get there.

PITFALL · "HE'S JUST DRUNK"

Alcohol, drugs, and head injury travel together, and intoxication is the most common reason a bleed is missed. An intoxicated patient is an **unreliable** patient: SMR criteria apply #702, a glucose check is mandatory, and any focal finding, unequal pupils, or failure to improve as expected is a head injury until a CT says otherwise.

CHAPTER 15

Spinal Injury and Spinal Motion Restriction

Restrict motion when it protects a cord. Skip the board when it only hurts the patient.

#702 #601 #660 #717

SMR is "maintaining the entire spine in anatomic alignment while minimizing gross movement," and it does not mandate a backboard #702. A cervical collar plus a cot with the patient secured and padded is SMR. The decision is criteria-driven.

THE RULE · SMR IS INDICATED IF ANY OF THESE IS PRESENT #702

Unreliable patient

- Uncooperative
- Altered mental status, any GCS under 15
- Unable to communicate or language barrier
- Intoxicated or unreliable from alcohol or drugs
- Distracting injury precluding a reliable exam, including severe pain

Spine findings

- Under 65: **midline** spine pain or tenderness
- 65 and older: **any** spinal-area pain
- Anatomic deformity of the spine

Abnormal neuro exam

- Cannot extend wrists and hands bilaterally
- Cannot plantarflex and dorsiflex feet bilaterally
- Abnormal sensation
- **Final step:** pain, weakness, or tingling with self-initiated movement (patient turns head left, right, up, down)

No SMR if the patient is negative for all criteria. **No SMR** for penetrating injury to the head, neck, or torso **unless a neurologic deficit is present**. ALS may discontinue SMR previously applied by reassessing the patient against all criteria #702.

How to do SMR well

- **Manual stabilization** during assessment for any mechanism with potential for spinal injury; avoid methods that provoke pain, movement, or combative behavior #702.
- **Ambulatory patients** may self-extricate with guidance; then lower them to the cot.
- **Non-ambulatory patients:** use a board, scoop, or similar device to transfer to the cot with minimal movement, then **remove the device** and secure for transport. Leave it only if removal interferes with critical care.
- **Isolated thoracic or lumbar** pain or deformity: no cervical collar needed, but limit thoracolumbar movement.
- **Backboards** remain useful for extrication, multiple moves, or as a splint for blunt trauma with multiple extremity fractures.
- **Children:** a car seat can be used for SMR if appropriate; pad shoulders and head for anatomic alignment.
- **Athletes** with helmets and shoulder pads: helmet removal may not be necessary if airway and alignment can be maintained.

THE WHY · WHY THE BOARD WENT AWAY

Rigid long boards cause pain, pressure injuries within an hour, restricted breathing, and agitation, and they do not restrict motion better than a well-padded cot. The 2018 joint statement by ACS-COT, ACEP, and NAEMSP endorsed SMR on a cot, scoop, or vacuum mattress, recommended against SMR for penetrating trauma without deficits, and said age alone should not drive pediatric spinal decisions Fischer 2018.

PEARL · HIGH-RISK SPINES

Assess for SMR even after low-energy mechanisms in children under 5, adults 65 and older, and patients with osteoporosis, rheumatoid arthritis, or ankylosing spondylitis #702. A stiff, curved spine (ankylosing spondylitis) fractures like a chalk stick; pad them in their own position rather than forcing them flat.

- **Document** how the patient was moved, secured, and transported, and what SMR method you used #702.

PITFALL · PENETRATING TRAUMA

In penetrating trauma, the bleeding, breathing, and decompression come first. SMR methods that slow those interventions are harmful #702.

FROM THE DEN The backboard is a great extrication tool and a terrible mattress. Nobody has ever left a five-star review for an hour on a long board.

Cord injury physiology

LEVEL	WHAT FAILS	WATCH FOR
C3 to C5	Phrenic nerve (diaphragm). "C3, 4, 5 keeps the diaphragm alive."	Apnea or abdominal-only breathing; early ventilatory support
Lower cervical	Intercostal muscles; arms and hands	Belly breathing, weak cough, fatigue over time
T6 and above	Sympathetic outflow	Neurogenic shock: low pressure, slow pulse, warm skin (Chapter 10)
Any level	Temperature control below the injury	Hypothermia; keep them covered

CHAPTER 16

Face, Eyes, Teeth, and Neck

Ugly injuries that rarely kill, next to quiet ones that do.

#660-A #704 #702 #709

THE RULE · FACIAL TRAUMA #660-A

Hemorrhage	Direct pressure and dressings, or approved hemostatic dressings
Eye trauma or foreign body	Cover **both** eyes with dressings; avoid direct pressure. Do not remove a foreign body or impaled object; stabilize it with bulky dressings
Chemical in the eye	Flush continuously with normal saline for at least 15 minutes or until hospital arrival; remove contact lenses if possible
Avulsed teeth	Place in saline-soaked gauze and transport with the patient
Impaled objects	Immobilize the object to prevent movement

The face

- **Airway first.** Midface (LeFort) fractures, a flail mandible, or heavy bleeding can obstruct the airway, especially when the patient is supine. Let a conscious patient sit forward if the spine allows (Chapter 11).
- **Intranasal medications** are contraindicated with nasal trauma and epistaxis #709; use IV or IM routes for pain and sedation.
- **Severe epistaxis** is a CPAP contraindication #703.
- Massive facial trauma with an obstructed upper airway is an indication for needle cricothyrotomy #704.
- Facial injury means head energy: assess the brain and the cervical spine #702.

The eye

- Why both eyes? The eyes move together; covering only the injured one lets it keep moving.
- A teardrop-shaped pupil or dark tissue at the edge of the iris suggests a ruptured globe: no pressure at all, a rigid shield if you have one.
- Alkali burns (lime, cement, drain cleaner) penetrate deeper than acid; flush longer.

The neck

DANGER SIGNS IN NECK TRAUMA

- Expanding or pulsatile hematoma
- Stridor, hoarseness, voice change
- Subcutaneous air (crackling under the skin)
- Coughing or spitting blood; difficulty swallowing
- Neurologic deficit (stroke signs from a vessel injury)

- Bleeding: direct pressure. Do not compress both sides of the neck, and do not wrap a circumferential dressing.
- Open venous neck wounds can entrain air: an occlusive dressing reduces the risk PEARL.
- Penetrating neck trauma: Step 2 alert #153; SMR only with a neurologic deficit #702.
- Laryngeal fracture: hoarseness, crepitus over the larynx, stridor after a blow (steering wheel, clothesline). This airway can close. Needle cric is in your scope for it #704.
- Strangulation and hanging: look for petechiae above the ligature, voice change, and swallowing difficulty even when the patient looks well. TXA is contraindicated in hanging #714.

PART

05

Belly, Pelvis, Limbs & Pain

Hidden bleeding, binders, splints, amputations, and pain control that is part of the treatment.

17 Abdominal Trauma

18 Pelvic Injuries and the Pelvic Binder

19 Extremities, Amputations, Crush, and Compartments

20 Pain Management in Trauma

COUNTY DOCUMENTS IN THIS PART #603 · #660 · #660-A · #706 · #713 · Formulary

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CHAPTER 17

Abdominal Trauma

The belly is a large, quiet place to bleed. The exam is unreliable; the mechanism and the vitals are not.

#660 #660-A #153

Solid organs bleed

The **liver** (right upper quadrant, under the lower right ribs) and **spleen** (left upper quadrant, under the lower left ribs) are the most commonly injured abdominal organs in blunt trauma. Fractures of the lower ribs on either side should make you think of the organ underneath. Bleeding can be fast and silent. Referred left shoulder pain (Kehr's sign) suggests blood irritating the diaphragm, classically from the spleen.

Hollow organs leak

Bowel and bladder injuries cause peritonitis over hours rather than shock in minutes. The **seatbelt sign** and **handlebar injuries** in children are the classic setups. Early on, the belly may be soft.

The retroperitoneum hides

Kidneys, the pancreas, the duodenum, and major vessels sit behind the abdominal cavity. Flank bruising (Grey Turner sign) and periumbilical bruising (Cullen sign) take hours to appear; do not expect them in the field.

THE RULE #660-A

- **Evisceration:** cover with a moist saline dressing. Do not push organs back in.
- **Impaled object:** immobilize it to prevent further movement; do not remove it.
- **Penetrating torso injury:** Step 2 alert #153.
- **Hypotension:** fluids and TXA per #660 #714.

PEARL · EVISCERATION PACKAGING

Moist sterile dressing on the bowel, then an occlusive layer (plastic) over it to keep it moist and warm, then a loose bulky dressing. Flex the knees to relax the abdominal wall if the spine allows. Keep the patient warm: exposed bowel loses heat fast.

PITFALL · THE BENIGN BELLY

A soft, non-tender abdomen in the field does not rule out injury, especially in intoxicated, head-injured, or distracted patients, and in children. Unexplained tachycardia after blunt trauma is abdominal or pelvic bleeding until proven otherwise.

FROM THE DEN The belly is a liar with a soft voice. "Soft, non-tender" in the field means nothing. Unexplained tachycardia means everything.

Exam in under a minute

1. **Look:** distension, wounds, abrasions, seatbelt sign, tire marks, evisceration. Look at the flanks and the back too.
2. **Feel:** all four quadrants gently, painful area last. Guarding, rigidity, and rebound are significant; their absence is not reassuring.
3. **Count:** heart rate trend and shock index. Belly injuries show up in the vitals before they show up on the skin.
4. **Ask:** shoulder pain, nausea, last meal, last menstrual period, pregnancy.

EVIDENCE · CHILDREN

Pediatric decision rules for intra-abdominal injury weight evidence of abdominal wall trauma and seatbelt sign, abdominal tenderness, vomiting, decreased breath sounds or thoracic wall trauma, and altered mental status. You do not need to memorize the rule; know that these field findings are exactly what the trauma team uses to decide on a CT, so report them precisely. PECARN

CHAPTER 18

Pelvic Injuries and the Pelvic Binder

A broken ring can hold the entire blood volume. A binder holds the ring.

#713 #660 #153

THE RULE · PELVIC BINDER #713 #660

Indications (ALL of the following):

1. High-risk mechanism
2. Pelvic, low back, or groin pain
3. SBP 90 or less

Contraindications: isolated fracture of the neck of the femur; suspected traumatic hip dislocation.

BLS: when in doubt about pelvic injury, avoid unnecessary movement and prepare the binder until ALS evaluates #660.

Application:

1. Remove clothing.
2. Identify the **greater trochanters** (the bony bumps at the top of the outer thigh), not the iliac crests.
3. Place the sheet or binder under the patient centered at the level of the greater trochanters.
4. Tighten per manufacturer; with a sheet, twist and secure to hold tension.
5. Check distal pulses before and after.

Removal: BASE

THE WHY

The pelvis is a ring of bone lined with large veins and venous plexuses. An "open book" injury separates the front of the ring and dramatically increases the volume the pelvis can hold, so the patient can bleed into it without limit. A binder closes the book, reduces the volume, stabilizes the broken ends so clot can form, and reduces pain. Placed at the iliac crests (too high), it can actually open the ring further and does little.

MECHANISMS AND SIGNS #713

High-risk mechanisms: MVC (especially front-seat head-on or lateral impact on the patient's side), auto vs pedestrian, motorcycle crashes, falls from height. Patients 65 and older break the pelvis with low-energy mechanisms.

Signs: any pain at the pelvis, low back, groin, or hips; hypotension; deformity, bruising, or swelling over bony prominences, pubis, perineum, or scrotum; leg length discrepancy or rotation; wounds over the pelvis; bleeding from the rectum, vagina, or urethra.

PITFALL · SPRINGING THE PELVIS

Do not rock or spring the pelvis #713. Manual stability testing is inaccurate, adds no useful information, and can dislodge clot. Move suspected pelvic fractures with a scoop or multi-person lift, not a log roll.

EVIDENCE

A 2025 NAEMSP Trauma Compendium statement found the evidence that binders reduce hemorrhage or mortality limited and noted device complications, while confirming that manual pelvic stability testing performs poorly. That supports exactly how SLO uses the binder: **targeted** to the hypotensive patient with a suspected pelvic injury, rather than every patient with a mechanism. NAEMSP 2025

FROM THE DEN The binder goes on the greater trochanters, not the iliac crests. Strap it at belt level and you've just made a very expensive pair of pants.

PEARL · PRACTICAL BINDER TIPS

- Slide the binder or sheet under the knees and "saw" it up to the trochanters; that avoids a log roll.
- Feet together and tape the knees and ankles (gently) after the binder; it closes the ring a little more and keeps the legs from rolling out.
- Pelvic injury with a high-risk mechanism is a **Step 2 alert** even before the pressure falls #153.
- Check under the binder for pressure on the skin if the transport is long.

CHAPTER 19

Extremities, Amputations, Crush, and Compartments

Limbs rarely kill in ten minutes. The ones that do are bleeding or are attached to someone who is.

#660-A #706 #153 #603

THE RULE · EXTREMITY INJURIES #660-A

Fractures	Splint with traction or other devices after gentle realignment as indicated. Neurovascular compromise: attempt to place in anatomic position, checking pulses and sensation before and after. Cover open wounds with a sterile dressing.
Dislocations	Splint in the position found.
Amputation	Wrap the part in a **dry** dressing, place it in a waterproof container or bag, place that on ice or a cool pack (**do not freeze**), and transport it with the patient. Bandage the stump and moisten with sterile saline.
Mangled extremity	Check distal pulses and sensation before and after; stabilize and splint after gentle realignment; cover with a clean or sterile dressing; #706 for persistent bleeding.
Notes	Padded box splints preferred for simple fractures (they image well). Confirm and mark distal pulses before and after splinting, traction, and movement. Traction splints for **isolated mid-shaft femur** fractures **without pelvic pain** (open or closed). Remove rings and constricting items.

FROM THE DEN The amputated part goes on ice, not in ice. Nobody at the hospital wants a finger popsicle.

Priorities

1. **Bleeding** from the limb is a primary-survey problem; tourniquet or pack #706.
2. **Triage criteria:** two proximal long-bone fractures, or a mangled, degloved, or pulseless extremity, is a Step 2 alert #153.
3. **Gross splinting for the critical patient:** secure the limbs to the body or the cot and go; formal splints en route.
4. **Detailed splinting for the stable patient** on scene is fine and improves pain and transport.
5. **Pulses, motor, sensation** before and after every manipulation, documented.

THE WHY · TRACTION FOR THE FEMUR

The thigh muscles spasm and pull the broken ends of the femur past each other. The thigh becomes shorter and rounder, and a round thigh holds far more blood than a long one. Traction restores length, reduces the volume, reduces pain, and reduces bleeding. It is contraindicated when the pelvis or hip may be injured, because the splint pushes against the pelvis (the county requires no pelvic pain) #660-A.

PITFALL · THE PULSELESS LIMB

A cold, pale, pulseless foot below a deformed knee or ankle needs **gentle realignment** toward anatomic position with pulse checks before and after #660-A. Leaving a limb ischemic for an hour can cost the limb. Knee dislocations injure the popliteal artery often, even when the knee reduced itself before you arrived.

Crush injury and crush syndrome

THE WHY

Prolonged compression of a large muscle mass (thigh, pelvis, buttocks), typically over an hour, kills muscle cells. They release potassium, acid, and myoglobin into stagnant blood. When the pressure is released, that blood rushes back into circulation: sudden hyperkalemia can cause dysrhythmias and arrest, and myoglobin injures the kidneys. The patient often looks deceptively well before release.

PEARL · WHAT TO DO IN SLO SCOPE

- Make **early base contact** during a prolonged entrapment; the county has no specific crush protocol, and treatments for hyperkalemia (calcium chloride, sodium bicarbonate) are base orders #644 and formulary; doses are in Appendix A.
- Cardiac monitor **before** release; watch for peaked T waves and a widening QRS.
- Establish IV access and give fluids per #660 and base direction.
- Consider a tourniquet on the trapped limb before release if bleeding is expected when pressure comes off #706.
- Pain control before the extrication moves them #603.

Compartment syndrome

Swelling inside a closed muscle compartment (most often the lower leg and forearm) raises pressure until it chokes off blood flow to the muscle. It develops over hours, so it is more of an interfacility and long-transport problem than a scene problem. The earliest and most reliable sign is **pain out of proportion to the injury**, especially pain on passive stretch of the muscles in the compartment. Pulselessness is a very late sign. Remove constrictive dressings and splints that are too tight, keep the limb at heart level (not elevated), and report it.

PEARL · OPEN FRACTURES

Gently irrigate gross contamination if time allows, cover with a sterile moist dressing, splint, and tell the receiving team when the injury occurred. Early antibiotics (a hospital intervention) reduce infection, and your time of injury helps them prioritize. Do not push bone ends back in, but realignment for neurovascular compromise is allowed and may draw them back under the skin; document it if it happens #660-A.

CHAPTER 20

Pain Management in Trauma

Treating pain is treatment. It lowers catecholamines, improves breathing, and makes packaging possible.

#603 #710 Formulary

THE RULE · ADULT MODERATE OR SEVERE ACUTE PAIN #603

Acute pain criteria: BP above the age-based minimum, unimpaired respirations, GCS normal for age.

DRUG	DOSE	REPEAT / MAX
Fentanyl IV	50 to 100 mcg **slow** IV over 1 minute (consider 25 mcg initial and maintenance doses over age 65)	After 5 min if needed; max 200 mcg total
Fentanyl IM / IN	50 to 100 mcg (1 mcg/kg as a guideline) when IV is difficult	After 15 min if needed; max 200 mcg total
Ketamine IV/IO	0.3 mg/kg (max 30 mg) in 100 mL NS over 10 minutes; label the bag "Ketamine / mg amount"	One-time dose; one additional dose BASE
Ketamine IM	0.5 mg/kg (max 40 mg)	One-time dose
Lidocaine IO	0.5 mg/kg (max 40 mg) slow IO push over 60 seconds, for pain after IO placement	Total max 40 mg

Multisystem trauma with head, thoracic, or abdominal injuries, or significant extremity trauma: ketamine 0.3 mg/kg IV/IO over 10 min or 0.5 mg/kg IM #603.

CONTRAINDICATIONS #603

Fentanyl: SBP under 90, hypoxia, impaired respiration. The formulary adds **shock, significant hypovolemia or hemorrhage**, respiratory depression, and known opioid intolerance, and lists head injury with risk of raised ICP as a precaution. Fentanyl with altered LOC, SBP under 90, or chronic pain, and additional doses: BASE.

Ketamine: pregnancy, history of schizophrenia, hypertensive emergencies, coronary chest pain. Formulary also lists conditions where a rise in BP is hazardous (such as aortic dissection) and hypersensitivity. **Not approved for pediatric patients** in SLO County.

Morphine: in the formulary only on the county medical director's order when fentanyl is unavailable, and contraindicated in head injury and multisystem trauma.

PEDIATRIC (34 KG OR LESS) #603

- Distraction first: video, calm environment, caregiver support.
- **Fentanyl 1.5 mcg/kg IN** (split between nares) or **1 mcg/kg IM**; may repeat after 15 min, max 4 doses.
- IV already established: **fentanyl 1 mcg/kg slow IV** over 1 min; may repeat after 5 min, max 4 doses.
- IN is the first-line pediatric route unless IV access is already in place (formulary). Max 0.5 mL per nostril in children (1 mL in adults) #709.
- IN is out with nasal trauma or a nosebleed, and may not absorb with severe hypotension, recent decongestant spray, septal problems, or congestion #709.
- No ketamine for children.

Choosing the drug

PATIENT	CHOICE AND REASON
Isolated extremity injury, normal vitals	Fentanyl IV, or IN/IM if no line. Splint and ice too #603
Hypotensive or at high risk of internal bleeding	Ketamine is the first-line analgesic when fentanyl is contraindicated by hypotension, respiratory injury, or multisystem trauma with high potential for internal hemorrhage #603
Rib fractures, chest wall injury	Fentanyl lowers the respiratory drive; ketamine preserves it. Pain control is pneumonia prevention
Opioid-tolerant patient	Ketamine may be preferable for habituation or addiction #603
Older adult	Fentanyl 25 mcg start; reassess; do not withhold #603

PATIENT	CHOICE AND REASON
Pregnant	No ketamine; fentanyl by criteria
Burns	Often need repeated doses; the ketamine formulary lists burns as an indication; pain per #633 #603

PEARL · ON-SCENE ANALGESIA

The county says to strongly consider starting pain management on scene when movement will be painful, unless an unstable condition requires rapid transport, and not to withhold appropriate pain medication because the transport is short #603. A femur fracture moved without analgesia is a patient whose heart rate and blood pressure you can no longer interpret.

PITFALL · KETAMINE MISTAKES

- Pushing it fast: the county dose is mixed in 100 mL and run over 10 minutes. Fast IV pushes cause dissociation and emergence reactions.
- Calling it sedation: dissociative doses are **not** an approved prehospital use in SLO #603.
- Giving it to a pregnant patient or a child.

FROM THE DEN Ketamine goes in a hundred milliliters over ten minutes. Push it fast and you'll spend the transport in a deep conversation with someone who is currently visiting another dimension.

PART

06

Special Populations

Children, older adults, and pregnant patients break the rules differently. Learn how.

21 Pediatric Trauma

22 Geriatric Trauma

23 The Injured Pregnant Patient

COUNTY DOCUMENTS IN THIS PART #153 · #601-A · #603 · #660 · #660-A · #702 · #714



★ ★ ★ ★ ★

CHAPTER 21

Pediatric Trauma

Smaller bodies, bigger heads, better compensation, and a faster fall when it ends.

#601 #601-A #153 #603 #660 #702 #714 #717

In SLO County, "pediatric" means **34 kg or less**: use the pediatric side of every protocol and a length-based tape for weight, doses, and equipment #601. A big 11-year-old may be an adult by protocol; a small 14-year-old may still be pediatric.

FROM THE DEN Weight decides the protocol, not age. The length-based tape doesn't care how proud Dad is that he's "big for his age."

How children are different

SYSTEM	DIFFERENCE	SO YOU
Head and neck	Large head and prominent occiput; lighter, weaker neck. Head injury is common and the spine injures higher (upper cervical)	Pad under the shoulders (and head as needed) for neutral alignment #702
Airway	Large tongue, small airway, floppy epiglottis; small amounts of swelling or blood obstruct	Position and suction first; BVM is the mainstay. ETI is for patients over 34 kg in this county #717; the i-Gel comes in pediatric sizes, 2 for 10 to 25 kg and 2.5 for 25 to 35 kg #718
Chest	Flexible ribs: severe lung contusion without rib fractures. Mediastinum is mobile, so tension shifts fast	A child with rib fractures took a large force. Watch oxygenation closely
Abdomen	Liver and spleen sit lower and are less protected by ribs; thin abdominal wall	Handlebar marks and seatbelt signs matter
Circulation	About 80 mL/kg blood volume (a 10 kg child has about 800 mL). Strong vasoconstriction keeps pressure normal until late	Use heart rate, perfusion, and mental status; hypotension is a pre-arrest sign
Temperature	Large surface area for their mass; little fat	Cover them and heat the compartment early
Bradycardia	Usually hypoxia	Ventilate and oxygenate before anything else

THE RULE · PEDIATRIC TREATMENT CHANGES

- **Fluids:** 20 mL/kg NS IV/IO, max 500 mL, for age-specific hypotension; may repeat once #660.
- **TXA:** not under 15 years #714.
- **Pain:** fentanyl 1.5 mcg/kg IN or 1 mcg/kg IV/IM; no ketamine #603.
- **Neurogenic shock refractory to fluids:** push-dose epi 1 mL (0.1 mL/kg if under 10 kg) BASE #660.
- **SMR:** car seat may be used; pad shoulders and head #702.
- **Traumatic arrest:** NS 20 mL/kg, reassess and repeat #661.

THE RULE · PEDIATRIC TRIAGE #153

Step 1 alert (34 kg or less): GCS 13 or less · poor perfusion · RR over 60 or respiratory distress, or under 20 in infants under 1 year · HR under 80 or over 180 (5 and under, under 22 kg) or under 60 or over 160 (6 and up, 23 to 34 kg) · SBP under 60 (newborn), under 70 (infant), under 70 + 2 × age (1 to 10), under 90 (11 to 14).

Step 3 consult: fall over 10 feet or twice the child's height. **Step 4:** any pediatric patient (34 kg or less) may get a consult on provider judgment.

PEARL · SHOCK INDEX FOR KIDS (SIPA)

Heart rate divided by systolic pressure, adjusted for age. A shock index over about **1.22 at ages 4 to 6**, **1.0 at 7 to 12**, or **0.9 at 13 to 16** has been associated with severe injury and need for transfusion in injured children. It is not in county protocol; it is a fast way to put a number on "this kid looks wrong." The 2025 NAEMSP pediatric trauma statement highlights SIPA and simplified GCS assessments for early recognition. Acker 2015 NAEMSP 2025

Non-accidental trauma

Abuse is a trauma diagnosis, and EMS is often the only provider who sees the home. Bruising is the most common abuse injury to be missed before a child is killed or nearly killed.

TEN-4-FACESP PIERCE 2021

In children under 4 years, bruising in these places, any bruise on an infant 4.99 months or younger, or patterned bruising should raise concern for abuse:

- **T**orso · **E**ars · **N**eck
- **F**renulum · **A**ngle of the jaw · **C**heeks (fleshy part) · **E**yelids · **S**ubconjunctival hemorrhage
- **p**atterned bruising (hand, loop, belt, bite)
- **4**: any bruise anywhere on an infant 4 months old or younger

In the validation study the rule was about 96% sensitive and 87% specific. "Those who don't cruise rarely bruise."

RED FLAGS IN THE STORY

- Mechanism that does not match the injury or the child's development (a 3-month-old who "rolled off the couch" with a skull fracture)
- The story changes between caregivers or over time
- Delay in calling for help
- Injuries of different ages
- Burns with sharp lines, stocking or glove patterns, or cigarette-sized circles

WHAT YOU DO

- Treat the child first; do not confront or accuse.
- Document objectively: exact quotes, who said them, the scene, and the injuries (location, size, shape, color).
- Tell the receiving physician privately.
- California EMTs and paramedics are mandated reporters of suspected child abuse; follow your agency's reporting process PEARL.

PITFALL · THE QUIET CHILD

An injured toddler who lets you start an IV without fighting is not brave; they are sick. Altered mental status in a child is a perfusion or brain problem until proven otherwise. Keep the caregiver close (it calms the child and keeps the exam honest), use intranasal fentanyl early, and reassess often.

CHAPTER 22

Geriatric Trauma

Low energy, high stakes. 110 is the new 90.

#153 #702 #713 #603 #125

Older adults get hurt more from less, compensate worse, and die more often from injuries a younger patient walks away from. Ground-level falls are the leading cause of injury in this group, and they are the call new medics most often under-triage.

THE RULE · COUNTY ANCHORS

- **Age over 65:** Step 4 consideration; **SBP under 110 may represent shock** #153.
- **Anticoagulant** (not aspirin) or bleeding disorder with a head injury (not minor): Step 4 consult #153.
- No consult needed for a ground-level or low-impact fall with GCS 14 or more, or GCS normal for the patient #153.
- **65 and older with any spinal-area pain** gets SMR; assess SMR even with low-energy mechanisms #702.
- Pelvic fractures are more likely even with low-energy mechanisms #713.
- **Fentanyl:** consider 25 mcg initial and maintenance doses over 65 #603.

THE WHY

- **Less reserve:** stiffer hearts and vessels; "normal" pressure may be their hypotension.
- **Masked tachycardia:** beta and calcium channel blockers, pacemakers.
- **Brain atrophy:** bridging veins stretch and tear with small forces; subdural blood can accumulate slowly.
- **Bleeding:** anticoagulants and antiplatelet drugs.
- **Bones:** osteoporosis turns falls into hip, pelvis, wrist, rib, and spine fractures.
- **Lungs:** rib fractures lead to pneumonia, respiratory failure, and death.
- **Skin and temperature:** thin skin tears and pressure injuries; poor heat regulation.

EVIDENCE

Substituting SBP under 110 for SBP under 90 in patients over 65 reduced under-triage with only a small rise in over-triage, and older patients with SBP 90 to 109 had mortality odds similar to those under 90 Brown 2015. In older adults, each additional rib fracture has been associated with higher risk of pneumonia and death Bulger 2000. The 2025 NAEMSP geriatric trauma statement recommends age-adjusted physiologic criteria for destination, prompt pain assessment and treatment, consulting POLST and similar documents, and judgment in how SMR is achieved given spinal curvature and pressure-injury risk; for older patients with head trauma, abnormal mental status, anticoagulation, and loss of consciousness are reasons to lean toward a trauma center NAEMSP 2025.

The geriatric fall, done right

1. **Why did they fall?** Tripped, or dizzy, short of breath, palpitations, chest pain, weak on one side, low sugar, new medication, infection? A fall can be the first sign of syncope, dysrhythmia, stroke, sepsis, or GI bleeding. Get a glucose; get a 12-lead if a cardiac cause is possible #707.
2. **How long were they down?** Long lies cause rhabdomyolysis, pressure injuries, dehydration, and hypothermia.
3. **Blood thinners?** Name, dose, last dose. Bring the list or photograph the bottles.
4. **Head strike?** Any head injury on an anticoagulant is a consult unless minor #153. Family's report of baseline mental status matters.
5. **Hips, pelvis, wrists, ribs, spine:** examine all of them; shortened, externally rotated leg is a hip fracture until proven otherwise.
6. **Pain control** before you move a broken hip: fentanyl 25 mcg and reassess #603.

7 **Pad and position:** pad bony areas and support kyphosis instead of forcing them flat; minimize time on hard surfaces #702.

PITFALL · NORMAL VITALS ON A BETA BLOCKER

An 82-year-old on metoprolol with a heart rate of 72 and a pressure of 108 after a fall down the stairs is not "stable." By county definition that pressure may represent shock #153, and the heart rate cannot rise to warn you. Look at the skin, the mental status, the mechanism, and the trend.

PEARL · GOALS OF CARE

Ask about POLST or advance directives early, kindly, and without assuming. A POLST with limited interventions still allows pain control, bleeding control, and comfort care; follow Sections A and B as written, and consult base if legitimacy is unclear #125. Many older trauma patients want full treatment; a frail patient on hospice may not want a trauma center at all.

FROM THE DEN One-ten is the new ninety. Grandma's 108 is your 85, and her metoprolol has her heart rate on mute.

ELDER ABUSE

Injuries of different ages, unexplained burns or fractures, poor hygiene, dehydration, pressure sores, or a caregiver who answers every question for the patient deserve attention. Document objectively and report concerns per your agency's process and California law.

CHAPTER

23 The Injured Pregnant Patient

Two patients, one treatment plan: take care of the mother and you take care of the baby.

#660-A #153 #603 #714 #620 #650

THE RULE

- **Over 20 weeks:** transport in the left lateral position #660-A #650.
- **Pregnancy over 20 weeks:** Step 4 trauma consult consideration #153.
- **Ketamine is contraindicated** in pregnancy #603; fentanyl by its usual criteria.
- **TXA:** pregnancy is a formulary precaution; indications and contraindications per #714.
- **Seizure** in pregnancy or up to 6 weeks postpartum: midazolam per protocol and request magnesium sulfate for possible eclampsia (4 g IV over 20 minutes) BASE #620.
- Third-trimester vaginal bleeding not associated with labor may indicate placenta previa or abruption: initiate transport early #650.

THE WHY · PHYSIOLOGY CHANGES THE NUMBERS

- **Blood volume** rises about 40 to 50%. She can lose a third of it before her vitals change.
- **Heart rate** runs 10 to 20 beats higher; blood pressure dips in the second trimester.
- **Breathing:** faster, lower normal CO2, less reserve, and she desaturates quickly.
- **Stomach:** slower emptying, higher aspiration risk.
- **Uterus** reaches the umbilicus around 20 weeks. Lying flat, it compresses the inferior vena cava and drops preload (supine hypotension).
- **Placenta:** no autoregulation. When mom clamps down to protect her own pressure, uterine flow drops first, so **the fetus is in trouble before the mother looks it**.

FROM THE DEN At twenty weeks the uterus is a bowling ball sitting on the vena cava, and nobody gets good preload with a bowling ball on the hose. Tilt left.

Positioning

If she can lie on her left side, do it. If she needs SMR, keep her on the cot or board and either tilt the whole cot or board 15 to 30 degrees to the left, or have a provider **manually displace the uterus to the left** while she stays flat. The 2025 NAEMSP statement on injured pregnant patients recommends manual left lateral uterine displacement for patients at least 20 weeks pregnant (or with a fundal height at the umbilicus) NAEMSP 2025.

What to look for

PROBLEM	CLUES	NOTES
Placental abruption	Abdominal or back pain, a firm or tender uterus, contractions, vaginal bleeding (may be absent because the blood can be trapped behind the placenta), shock out of proportion to visible bleeding	The leading obstetric cause of fetal death after blunt trauma; can follow "minor" trauma and may present hours later
Uterine rupture	Severe pain, shock, fetal parts felt easily through the abdomen, a uterus that is hard to define	Rare, catastrophic; rapid transport
Preterm labor	Regular contractions, fluid leak, bleeding	Time contractions; note fluid color
Maternal hemorrhage	Same as any trauma patient, but later to show	Treat early and aggressively by protocol

PEARL · QUESTIONS TO ASK

- How many weeks? Due date? Prenatal care?
- Gravida and para #650
- Pain, contractions, bleeding, or fluid leaking?
- Is the baby moving like normal?
- Where was the seatbelt? (A lap belt across the uterus instead of the hips transmits force to it)
- Asked privately: does she feel safe at home?

PITFALL · TREATING THE FETUS INSTEAD OF THE MOTHER

The best fetal resuscitation is maternal resuscitation: oxygen, blood pressure, left uterine displacement, and speed. Do not delay maternal care to search for fetal heart tones. Do not withhold indicated medications for the mother because she is pregnant, except where the county specifically excludes them (ketamine).

TRAUMATIC ARREST IN LATE PREGNANCY

Standard traumatic arrest care #661 plus continuous **manual left uterine displacement**. A pregnancy past about 20 weeks in arrest may need emergency delivery at the hospital within minutes to give either patient a chance, so early notification and rapid transport to the closest appropriate facility matter more than anything you do on scene NAEMSP 2025. Use base contact per #661 and #125.

PART

07

Burns & Environmental

Thermal, chemical, electrical, water, heat, cold and bites: trauma that brings its own physics.

24 Thermal Burns

25 Inhalation, Electrical, and Chemical Injuries

26 Drowning and Diving Emergencies

27 Heat, Cold, and Bites

COUNTY DOCUMENTS IN THIS PART #630 · #631 · #632 · #633 · #634 · #614

★ ★ ★ ★ ★

CHAPTER

24

Thermal Burns

The burn is rarely what kills them in the first hour. The airway, the poison in the smoke, and the other injuries are.

#633 #603 #153 #155 #125

THE RULE · BURNS #633 (EFFECTIVE 08/07/2026)

BLS

- Remove burning, smoldering, or constrictive clothing and jewelry.
- **Cool running water (CRW)** for all burns **except electrical** that are **under 30% BSA** with **no inhalation injury**. Goal: **20 minutes cumulative**, counting bystander and first responder time.
- Thermal: stop the burning; do not break blisters; after CRW, cover with a **dry, sterile dressing or sheet**.
- Tar: do not remove it.
- Consider Policy #155 (EMS helicopter) for direct transport out of county to a burn center for patients meeting burn center criteria.

ALS

- Pain per #603.
- **Wheezing:** albuterol 2.5 to 5 mg via HHN, mask, CPAP, or BVM, combined with ipratropium 500 mcg (pediatric 250 mcg, HHN/mask/BVM); ipratropium may repeat once after 20 minutes.
- **Fluids:** consider NS up to 500 mL IV/IO (pediatric 20 mL/kg, max 500 mL). May repeat once for persistent hypotension, or once at ALS discretion for normotensive patients.
- Base orders as needed.
- Determination of death per #125.

Depth and size

DEPTH	LOOKS LIKE	COUNTS IN TBSA?
Superficial (1st)	Red, dry, painful, no blisters (sunburn)	No
Superficial partial (2nd)	Blisters, wet, shiny, very painful, blanches	Yes
Deep partial (2nd)	Mottled red and white, less painful, slow blanching	Yes
Full thickness (3rd)	Leathery, waxy white, tan or charred, painless centrally	Yes
Fourth degree	Into fat, muscle, tendon, or bone	Yes

REGION	ADULT %	SMALL CHILD %
Head and neck	9	18
Each arm	9	9
Front of torso	18	18
Back of torso	18	18
Each leg	18	13.5
Perineum	1	1

The patient's own palm with fingers is about 1% (useful for scattered burns). Count only partial and full thickness.

THE WHY · COOL WATER, BUT NOT HYPOTHERMIA

Burned tissue keeps cooking after the heat source is gone. Cool running water stops that process and reduces final burn depth. In a large pediatric cohort, 20 minutes of cool running water within 3 hours of injury was associated with about 40% lower odds of skin grafting Griffin 2020. Above 30% TBSA, or with inhalation injury, the risk of hypothermia outweighs the benefit, which is exactly where #633 draws the line. Cool, not ice: ice deepens the injury.

BURN CENTER REFERRAL CRITERIA #633

- Partial thickness over 10% TBSA
- Face, hands, feet, genitalia, perineum, or major joints
- Third-degree burns in any age group
- Electrical burns, including lightning
- Chemical burns
- Inhalation injury
- Preexisting disorders that complicate care
- Burns with concomitant trauma where the burn is the greatest risk (if trauma is the greater risk, a trauma center may stabilize first)
- Children (ideally a pediatric-verified burn center)
- Patients needing special social, emotional, or rehabilitative care

FROM THE DEN Cool water, not ice. Ice turns a burn into a burn-and-frostbite combo, and nobody ordered the combo.

Fluids: why the county's 500 mL is not a burn formula

THE WHY · BURN SHOCK IS SLOW

Burn shock comes from plasma leaking out of damaged capillaries over **hours**. A burn patient who is hypotensive in the first hour is usually hypotensive from something else: trauma from a fall or explosion, carbon monoxide, cyanide, or another medical cause. Look for it. The county bolus treats hypotension; it is not a substitute for the hourly burn resuscitation the hospital will calculate.

PEARL · WHAT THE BURN TEAM STARTS

Advanced Burn Life Support teaches starting rates by age for large burns (20% TBSA or more) before a weight-based formula is calculated: roughly **125 mL/hr** for young children, **250 mL/hr** for school-age children, and **500 mL/hr** for teens and adults, usually lactated Ringer's. Over-resuscitation causes airway swelling, compartment syndromes, and lung injury. Know this so you can explain what you gave and why, not to replace county dosing. ABLS

Destination

THE RULE

- **Burns with a trauma mechanism:** Step 4 consideration; trauma triage applies #153.
- **Burn center criteria met:** consider direct air transport out of county under Policy #155 #633.
- Otherwise, destination per county policy and base direction.

KNOW YOUR REGION (VERIFY CURRENT STATUS)

The nearest ABA-verified burn center to SLO County is the **Leon S. Peters Burn Center** at Community Regional Medical Center in Fresno. Other regional options include UCLA Health's burn center in West Hills and Santa Clara Valley Medical Center in San Jose. The **Grossman Burn Center in Bakersfield closed June 30, 2026**. Burn destination decisions are usually made with base and air medical; confirm capability before you commit. CA EMSA 2025

PITFALL · BURN TUNNEL VISION

- Missing the fall, the blast, or the car crash because the burns are dramatic. Do a full primary survey.
- Cooling a 50% burn on a cold night until the patient is hypothermic.
- Wet dressings over large areas. The new county protocol uses **dry** sterile dressings after CRW.
- Under-treating pain. Burns are among the most painful injuries you will see **#603**.
- Circumferential burns: check distal pulses on limbs, and watch for poor chest rise with chest burns (escharotomy is a hospital procedure).

CHAPTER 25

Inhalation, Electrical, and Chemical Injuries

Injuries where what you see on the skin badly understates what is happening inside.

#633 #717 #602 #614 #660-A #707

Inhalation injury and the burned airway

THE RULE #633

Endotracheal intubation remains the **gold standard** for burn airway management because upper airway swelling after thermal injury or superheated gas progresses rapidly and unpredictably. Warning signs: **facial burns, singed nasal hairs, carbonaceous (sooty) sputum, stridor, or voice change #633**. Needle cric is indicated for facial burns with upper airway involvement when conventional maneuvers fail #704.

PEARL · DECIDE EARLY

The airway that looks fine at minute 10 can be impossible to intubate at minute 60. Hoarseness, stridor, and drooling in a closed-space fire victim are reasons to notify early and get the patient to the team that can secure the airway, by the fastest route. If you are going to intubate in the field, the first attempt is your best attempt.

Carbon monoxide and cyanide

	CARBON MONOXIDE	CYANIDE
Setting	Closed-space fire, generators, heaters, vehicles in garages; multiple patients with the same symptoms	Closed-space fires burning plastics, foam, fabrics
Signs	Headache, nausea, dizziness, confusion, seizures, chest pain; the pulse oximeter reads **falsely normal**	Altered mental status, seizures, collapse, hypotension, severe acidosis
Field care	Remove from the source; **high-flow O2 by nonrebreather** for the symptoms, even with a normal SpO2, because the oximeter reads falsely normal #602 PEARL. Multiple victims with the same symptoms: think CO or hazmat #614	High-flow O2, airway and circulation support, rapid transport; antidote is a hospital treatment in this county
Tell the ED	"Closed-space fire" and how long the patient was exposed. Pregnant patients and fetuses are especially vulnerable to CO.	

FROM THE DEN Carbon monoxide is the only patient whose pulse oximeter gives them a perfect score while they're failing the test. High-flow oxygen anyway.

Electrical injury

- **Power off first.** Turn off the source and remove the victim from the hazard safely; then cover burns with a dry sterile dressing #633. Do not approach downed lines until the utility confirms they are dead.
- **No cooling** for electrical burns under #633.
- **Monitor the rhythm.** Alternating current causes VF; high voltage and lightning cause asystole and respiratory arrest. Get a 12-lead when the patient is stable #707.
- **Look for the fall.** Electrical injuries throw people off ladders and poles; assess for trauma and SMR.
- **The skin lies.** Small entry and exit wounds can hide extensive muscle damage along the current's path

PEARL · LIGHTNING: REVERSE TRIAGE

Lightning often stops the heart and the breathing center together; the heart may restart on its own while the patient stays apneic and then arrests again from hypoxia. With multiple lightning victims, the classic teaching is to resuscitate the apparently dead first, because the moving, moaning patients will likely survive. That is the opposite of START (Chapter 30) and applies to lightning specifically.

(rhabdomyolysis, compartment syndrome, kidney injury).

- Electrical burns, including lightning, meet burn center criteria #633.

PITFALL · "JUST A LITTLE SHOCK"

Household current with no symptoms and a normal ECG is often low risk, but any loss of consciousness, abnormal rhythm, high voltage, wet skin, current across the chest (hand to hand), burns, or pregnancy needs evaluation. Pregnant patients with any electrical exposure need fetal assessment.

Chemical injuries

THE RULE #633 #614 #660-A

- **Dry substance:** brush it off first, remove contaminated clothing, then flush with large quantities of water.
- **Liquid:** remove wet or contaminated clothing and flush with large quantities of water.
- **Eyes:** flush continuously with normal saline for at least 15 minutes or until hospital arrival; remove contacts.
- **Protect yourself** from contact and secondary exposure; multiple victims with the same symptoms means hazmat (Policy #201).

THE WHY

Chemicals keep burning until they are removed or diluted. Alkalis (cement, lye, drain cleaner, airbag residue) liquefy tissue and penetrate deeper than acids, so they need longer irrigation. Brushing dry powder first matters because some powders (lime, for example) react with water and generate heat. Hydrofluoric acid can cause severe pain with little visible burn and dangerous drops in calcium; tell the ED exactly what the chemical was.

CHAPTER 26

Drowning and Diving Emergencies

A coastal county's trauma. Fix the oxygen first; the rest follows.

#632 #634 #703 #702 #714

THE RULE · DROWNING #632

- Drowning is respiratory impairment from submersion or immersion in a liquid. **Hypoxia** is the primary reversible cause of death.
- Trained rescuers may give in-water rescue breaths if safe and effective, without delaying removal from the water (no compressions in the water).
- **Apnea or arrest:** 5 initial rescue breaths before ventilation or compressions; minimize interruptions in oxygenation and ventilation; PEEP valve when available; expect vomiting; ventilate through the "foam" (surfactant). Suction water and vomit only when present.
- Early ETI or SGA as indicated; with non-shockable rhythms, you may forgo vector change to minimize ventilation interruptions.
- Alert patient short of breath: **CPAP** #703 (its drowning range is 7.5 to 10 cm H2O, over 34 kg); monitor EtCO2.
- Persistent cough, abnormal lung sounds, altered mental status, hypoxia, hypotension, or dyspnea needs ALS assessment and transport; symptoms can **worsen over 6 hours**.
- **C-spine:** not recommended unless there is strong evidence of a traumatic mechanism (for example, a dive into shallow water or a surf impact). Use SMR then without delaying ventilation #702.
- Resuscitate all patients with a known submersion time of **25 minutes or less**, regardless of water temperature.
- Base consult (Policy #121) as needed for long downtimes, trauma, airway problems, prolonged PEA or asystole, and cold water immersion.
- Do not use "near," "dry," "delayed," "secondary," or "wet" drowning.

PEARL · DOCUMENT WHAT THE HOSPITAL NEEDS

Witness statements, submersion time, water type and temperature, initial presentation and neurological status, and bystander interventions #632. Lifeguards and witnesses are your best source for downtime; get their names. TXA is contraindicated in drowning #714.

THE WHY · BREATHS BEFORE COMPRESSIONS

In a typical cardiac arrest, the blood is still oxygenated when the heart stops, so compressions circulate oxygen. In drowning, the heart stops because the blood ran out of oxygen; compressions alone circulate empty blood. That is why ventilation and oxygenation lead, and why drowning arrests with PEA or asystole may benefit from prolonged resuscitation, especially in cold water #632.

FROM THE DEN Drowning is an oxygen problem wearing a wetsuit. Breaths first, compressions second.

SCUBA diving emergencies #634 · NEW 08/07/2026

THE RULE #634

- **100% O2 by nonrebreather regardless of signs, symptoms, or SpO2** (unless oxygen toxicity is the suspected cause).
- Treat and transport **supine** unless vomiting or the patient cannot tolerate it.
- **CPAP is generally contraindicated** because of barotrauma risk.
- Bring the **dive computer**; get max depth, time at depth, ascent rate, number of dives, surface interval, and gas used. Do not delay transport for it.
- Frequent neurologic exams; address hypothermia.
- Consider Policy #155 for direct air transport to a hyperbaric chamber.
- ALS: NS up to 500 mL for possible dehydration (pediatric 20 mL/kg, max 500); needle thoracostomy for suspected barotrauma with tension physiology #705.
- Free diving: also use the drowning protocol. (The #634 page cites drowning as "#663"; the drowning protocol is #632.)

PROBLEM	CLUE
Arterial gas embolism	Symptoms within seconds to minutes of surfacing, often after a breath-holding ascent: stroke signs, LOC, seizure, arrest
Decompression sickness	Joint pain, rash, numbness, weakness, or confusion developing minutes to hours after the dive
Pulmonary barotrauma	Chest pain, dyspnea, unilateral breath sounds, subcutaneous air; pneumothorax or tension
SIPE	Pulmonary edema from immersion and exertion without aspiration; moderate or severe SOB: base for orders (such as CPAP)
Contaminated gas / CO	Headache, confusion, multiple divers from the same fill
Nitrogen narcosis	Euphoria and confusion at depth that resolve on ascent

Divers Alert Network (DAN): 919-684-9111, a resource for crews and receiving hospitals discussing hyperbaric therapy #634. The number one cause of diving deaths is drowning.

CHAPTER 27

Heat, Cold, and Bites

The environment injures people directly, and makes every other injury worse.

#631 #630 #601 #660 #706

Hypothermia in the trauma patient

THE WHY

Most trauma hypothermia is not from a snowbank. It is from blood loss (less heat production), exposure for assessment, wet clothing, cold pavement, cold fluids, and a cold ambulance. Clotting enzymes slow as the body cools, so hypothermia feeds the lethal diamond (Chapter 1). The patient you expose must be covered immediately afterward #601, and body temperature maintained #660.

PEARL · PRACTICAL WARMING

- Heat on in the patient compartment before the patient arrives.
- Cut off wet clothing; dry the patient; blankets above and below.
- Cover the head; it is a large heat-loss surface in children.
- Use warmed fluid if your agency carries a warmer.
- Close the doors between scene tasks.

THE RULE · HYPERTHERMIA AND HYPOTHERMIA #631

Heat: remove from the environment and begin cooling: remove clothing, cool with water and fans or air conditioning, ice packs to the neck, armpits, and groin. Alert patients may receive up to 1 liter of water or sports drink (50/50 with water) in small amounts if tolerated. Heat-related seizures per #620.

Cold: remove from the environment, move to warmth, remove wet clothing, rewarm with blankets and heaters. Pulses may be hard to find: check for **30 to 45 seconds**. **Rough handling may trigger arrhythmias.** Frostbite: rewarm in tepid water only if evacuation is not possible for 6 to 12 hours and there is no risk of refreezing; then gauze between the digits and splint as needed.

Bites and stings

THE RULE #630

Snake bite	Do not delay transport. Remove constricting items near the site. **Mark the edge of swelling and record the time.** Irrigate the wound. **No ice. No incision or suction.**
Animal bite	Hemorrhage control per #706 as indicated.
Insect sting	Remove the stinger; apply ice; watch for anaphylaxis per #611.
Jellyfish	No heat. Rinse with normal saline (vinegar or baking soda if available).
Other marine (stingray)	Remove the barb if necessary; warm compresses.

PEARL · RATTLESNAKES ARE A DESTINATION PROBLEM

The Northern Pacific rattlesnake is our local species. Swelling that keeps spreading and abnormal clotting labs drive antivenom dosing, and a moderate bite can use a lot of vials. Call the receiving hospital early to confirm antivenom supply. Your marked, timed swelling edge is the hospital's first data point for how fast it is progressing.

PITFALL · DOG BITES ARE TRAUMA

Large dog attacks on children cause deep scalp, face, and neck injuries, crush injury, and significant blood loss. Treat them as penetrating trauma: primary survey, hemorrhage control, and triage criteria, not just "a bite."

FROM THE DEN No ice, no cutting, no sucking. If your snakebite plan came from a cowboy movie, it's the wrong plan. Mark the swelling, write the time, and drive.

PART

08

Arrest, Triage & Destination

Traumatic arrest, the four-step triage scheme, the radio report, and the multi-casualty incident.

28 Traumatic Cardiac Arrest

29 Trauma Triage and Destination

30 The Multi-Casualty Incident

COUNTY DOCUMENTS IN THIS PART #125 · #151 · #153 · #155 · #661 · #705 · #708



★ ★ ★ ★ ★

CHAPTER 28

Traumatic Cardiac Arrest

A different arrest with a different playbook. Fix the cause; compressions come second.

#661 #125 #705 #708 #714 #153

THE RULE · TRAUMATIC CARDIAC ARREST #661

BLS: obvious death per #125. Otherwise HPCPR 10:1 with interruptions under 5 seconds.

ALS · arrest after EMS arrival and under 20 minutes from a trauma center:

- **Do not delay transport**; ALS treatment en route.
- NS up to 500 mL; repeat once if no ROSC or SBP under 90 (pediatric 20 mL/kg, reassess and repeat).
- **No epinephrine or amiodarone** unless the arrest is suspected to be of medical origin.
- Treat reversible causes: hypoxia, hypovolemia, tension pneumothorax.
- Suspected chest trauma: **bilateral needle thoracostomy** #705.

Absent signs of life on EMS arrival: consider non-initiation per #125 (pulseless, apneic, no heart or lung sounds, fixed and dilated pupils).

Base: arrest after EMS arrival and **more than 20 minutes** from a trauma center or hospital: contact the SLO Trauma Center for treatment and destination. Termination by base order.

Notes: trauma center preferred if equal or near-equal distance. Do not delay transport for an advanced airway. Consider medical origin in older patients with a low-energy mechanism. Unsafe scenes may warrant transport. Minimize disturbance of a crime scene. If no ALS airway is placed, document why.

HOTT: the four things you can fix

CAUSE	SHARE OF TCA	FIELD ACTION
H · Hypovolemia	About 48%	Stop external bleeding (tourniquet, packing), pelvic binder, fluids per #661, fastest transport to a surgeon
O · Oxygenation	About 13%	Open and clear the airway, ventilate with oxygen; least invasive airway that works
T · Tension pneumothorax	About 13%	Bilateral needle thoracostomy when chest trauma is suspected #661 #705
T · Tamponade	About 10%	Requires a surgeon; rapid transport with early notification

Approximate distribution from a 2024 narrative review of traumatic cardiac arrest J Anesth Analg Crit Care 2024.

THE WHY · COMPRESSIONS DO NOT FILL AN EMPTY HEART

Chest compressions move blood that is already in the heart. In hemorrhage the heart is empty; in tension and tamponade it cannot fill. Compressions also delay and get in the way of the procedures that can actually help. The 2025 joint position statement of NAEMSP, ACS-COT, and ACEP emphasizes life-saving interventions first: hemorrhage control, airway with the least-invasive effective approach, and chest decompression when tension is suspected. External compressions may be considered but only **secondary** to those interventions, epinephrine should not be routine, and empiric bilateral decompression is not indicated without suspected chest trauma NAEMSP 2025.

PEARL · WHO SURVIVES

Overall survival after traumatic arrest is poor (mortality around 92 to 100% depending on the system), but not zero. Patients who still have **organized electrical activity** or signs of life when EMS arrives, a short time to a surgeon, and a fixable cause (tension, external bleeding, airway) are the survivors. In one Swedish cohort, patients with low-output states and some signs of life had about 8% survival, while those with no output had essentially none 2024 review. That is why the county splits its decision by whether arrest happened after EMS arrival and how far away the trauma center is.

The decision in 15 seconds

1. **Obvious death or absent signs of life on arrival with trauma?** Withholding is allowed without base contact #125; document findings (pulse, breathing, heart and lung sounds, pupils, rhythm strip if ALS).
2. **Arrested in front of you, or signs of life on arrival?** Resuscitate and treat HOTT.
3. **Under 20 minutes to a trauma center?** Load and go; treat en route #661.
4. **Over 20 minutes?** Contact the SLO Trauma Center (Sierra Vista) for treatment and destination #661 #125.
5. **Could this be medical?** An older patient with a minor crash who may have had a cardiac arrest first: treat as medical arrest #641, which brings back epinephrine, defibrillation, and amiodarone.

PITFALL · RUNNING A MEDICAL CODE ON A TRAUMA ARREST

- Epinephrine in a patient who bled out tightens already-clamped vessels and fixes nothing.
- Standing on scene for 20 minutes of CPR on a penetrating wound when the trauma center is 12 minutes away.
- The AED: consider **not** using it in traumatic arrest unless the trauma is suspected to be secondary to a cardiac event #708.
- TXA after more than 5 minutes of CPR without ROSC is contraindicated #714.

DESTINATION EXCEPTIONS #153

Trauma patients go to the **closest ED** instead of a trauma center for: an unmanageable airway (intubation unsuccessful and BVM or other device cannot maintain an airway), uncontrollable bleeding with rapidly deteriorating vital signs, or traumatic cardiac arrest (see #125). Also: a SLO trauma center destination order, patient refusal (#203), or a trauma center on complete diversion (#154). The Attachment A flowchart adds: **contact the trauma center** and transport to the closest ED. Remember #661 also prefers a trauma center when it is equal or near-equal in distance.

FROM THE DEN Epinephrine in a patient who bled out is turning up the radio in a car that's out of gas. Fix the tank first: HOTT.

CHAPTER

29 Trauma Triage and Destination

Know which step you are calling before you key the mic.

#153 #153-A #151 #155 #660

THE RULE · POLICY #153, EFFECTIVE 01/01/2026

STEP	CRITERIA (ANY ONE)	CALL · DESTINATION
1 · Physiologic	**Adult:** GCS 13 or less (attributed to injury) · SBP under 90 · RR under 10 or over 29. **Pediatric (34 kg or less):** GCS 13 or less · poor perfusion · RR over 60 or respiratory distress; under 20 in infants under 1 · HR under 80 or over 180 (5 and under, under 22 kg); under 60 or over 160 (6 and up, 23 to 34 kg) · SBP under 60 newborn, under 70 infant, under 70 + (2 × age) ages 1 to 10, under 90 ages 11 to 14	**TRAUMA ALERT** to the closest trauma center; off scene in 10 min or less
2 · Anatomic	Significant penetrating injury to head, neck, torso, or extremities proximal to elbow or knee · chest wall instability or deformity (flail) · two proximal long-bone fractures · mangled, degloved, or pulseless extremity · open or depressed skull fracture · paralysis · pelvic injury with high-risk mechanism (MVC, auto vs pedestrian, motorcycle, falls from height)	**TRAUMA ALERT** to the closest trauma center; 10 min or less
3 · Mechanism	Falls: adult over 20 ft (one story = 10 ft); child over 10 ft or twice their height · High-risk auto crash: intrusion over 12 in at the occupant site or over 18 in anywhere in the passenger space; ejection, partial or complete; death in the same compartment · Auto vs pedestrian or bicyclist thrown, run over, or significant impact over 20 mph · Motorcycle or unenclosed vehicle crash over 20 mph	**TRAUMA CONSULT** with the SLO trauma center for destination; 10 min or less
4 · Special	EMS provider judgment · age over 65 (SBP under 110 may represent shock) · pediatric (34 kg or less) · pregnancy over 20 weeks · anticoagulation (excluding aspirin) or bleeding disorder with head injury (excluding minor) · burns with trauma mechanism	**TRAUMA CONSULT**. Not required for ground-level or low-impact falls with GCS 14 or more, or GCS normal for the patient

CLOSEST TRAUMA CENTER #153

- Scene **south of El Campo Road**: Marian Regional Medical Center (Santa Maria).
- Scene **north of El Campo Road**: Sierra Vista Regional Medical Center (San Luis Obispo; now Adventist Health Sierra Vista).
- East or west of El Campo Road: crew discretion for the closest or fastest.
- Always account for traffic, congestion, and travel factors.
- The "SLO Trauma Center" for consults is Sierra Vista. When it is not receiving the patient, it notifies the receiving hospital.

Marian was ACS-verified as a Level II trauma center in 2022; Sierra Vista is SLO County's only designated trauma center (Level III). Confirm current levels with your agency.

THE WHY · ALERT VS CONSULT

Physiology and anatomy predict serious injury well, so Steps 1 and 2 go straight to a trauma center without asking. Mechanism and special considerations predict it less well, so Steps 3 and 4 are a **conversation** with the trauma center about where this specific patient should go. The national 2021 field triage guideline made the same split, calling physiology and anatomy "red" (high risk) and mechanism and judgment "yellow" (moderate risk) ACS-COT 2021.

The reports MIVT FORMAT

SAY IT · TRAUMA ALERT

1. "Trauma Alert, meeting Step [x]."
2. Unit and medic number.
3. ETA to the trauma center.
4. **M**: age, sex, mechanism.
5. **I**: injuries and complaints.
6. **V**: vitals including GCS.
7. **T**: treatment.
8. The specific findings that met alert criteria.

SAY IT · TRAUMA CONSULT

1. "Trauma Consult, meeting Step [x]."
2. Unit and medic number.
3. ETA to the trauma center **and** ETA to the closest ED (say so if the trauma center is the closest).
4. MIVT: age and sex, mechanism and scene, injuries and complaints, vitals with GCS, treatment and response.
5. The findings that met consult criteria.

Only ALS may request a consult. ALS must contact the trauma center with an alert. Give the alert early, from scene when possible, and a brief update for significant changes en route #153. Include step criteria in the base report; update 5 minutes out or with changes #660.

SLO county and the national guideline, side by side

TOPIC	SLO #153 (GOVERNS HERE)	NATIONAL GUIDELINE 2021 (FOR CONTEXT)
Adult hypotension	SBP under 90; over 65, SBP under 110 "may represent shock" (Step 4)	Ages 10 to 64: SBP under 90 or HR greater than SBP; 65 and older: SBP under 110 or HR greater than SBP (red)
Mental status	GCS 13 or less	Unable to follow commands (motor GCS under 6)
Respiratory	RR under 10 or over 29	RR under 10 or over 29; respiratory distress or need for support; room-air SpO2 under 90%
Bleeding	Mangled, degloved, or pulseless extremity	Adds: active bleeding requiring a tourniquet or wound packing with continuous pressure; amputation proximal to wrist or ankle
Falls	Adult over 20 ft; child over 10 ft or twice height	Over 10 ft for all ages
Crash	Intrusion, ejection, death in compartment	Adds: need for extrication; child 0 to 9 unrestrained or in an unsecured seat; vehicle telemetry

PEARL · USING PROVIDER JUDGMENT WELL

Step 4's first line is **EMS provider judgment** #153. The national criteria in the right column are a good list of things that should make your judgment uneasy: a tourniquet on a limb, an amputation above the wrist, an extrication, an unrestrained small child, a low SpO2 on room air. When the scheme says no but your gut says yes, call the consult and say why.

FROM THE DEN When the scheme says no and your gut says yes, make the call. Nobody has ever been written up for a trauma consult that turned out to be boring.

Air medical POLICY #155 · EFFECTIVE 09/30/2025

Helicopter use for trauma must follow Policy #155 #153. The newer burn and diving protocols also point to #155 for direct transport out of county to a burn center or hyperbaric chamber #633 #634.

THE RULE · REQUESTING A HELICOPTER #155

- **SLU ECC** is the ordering point for every EMS helicopter and coordinates requests and cancellations.
- Mode of transport is an **operational decision**: follow the incident commander's direction (Policy #200).
- Responding or on-scene crews may request one when **time and need** are both met, or at their discretion.
- **Time:** air saves at least **10 minutes** over ground (consider specialty center destinations), or the scene is hard to reach by ground.
- **Need:** care not available by ground (for example blood, pediatric intubation, surgery, medications, or a base physician asking for air), #153 trauma criteria, #152 STEMI criteria, any hemodynamically compromised child, unresponsive altered mental status, severe respiratory compromise, childbirth complications, medical hypotension unresponsive to treatment, stroke signs, a Code 3 transport, or provider discretion.
- Not for patients contaminated by hazardous materials.
- Destination follows #151, #152, and #153, but the flight crew may take the patient to a higher level of care outside the county.

HOW THE EARLY LAUNCH WORKS

In the county's expedited launch zones, where air should save at least 10 minutes, or when a scene is hard to reach, SLU ECC can start a helicopter before you arrive on a credible report of: a high-risk crash (major damage or entrapment, ejection, more than 3 patients, rollover, a death or CPR on scene, auto versus pedestrian, a bus, train, or plane, an unrestrained child 0 to 9); a rider separated from a motorcycle, ATV, or horse with significant impact; a pedestrian or cyclist thrown or run over; a **fall over 10 feet**; a gunshot or stabbing; burns; industrial or agricultural accidents; crush; amputation or vascular compromise; **bleeding that needs a tourniquet or packing**; pregnancy complications; drowning; a patient unconscious or out of reach. SLU ECC may cancel when the incident commander, with the most medically qualified responder, decides it is not needed, or when a second helicopter is at least 5 minutes closer. The flight crew may still choose to continue and assess.

THE LANDING ZONE #155 ATTACHMENT B

- Flat, firm, and free of loose debris; wet down dust and tell the flight crew.
- **100 by 100 feet** by day; **125 by 125 feet** at night.
- Clear of people, animals, and vehicles; check for wires, poles, antennas, stumps, and irrigation gear. Assign crowd control.
- At night, aim vehicle headlights toward the center of the zone. **Never use flares** or anything the downwash can blow around.
- **HOTSAW:** Hazards, Obstructions, Terrain, Surface, Animals, Weather and wind.

PEARL · REQUEST EARLY OR NOT AT ALL

The early-launch list in #155 reads a lot like the national triage criteria in the table above: falls over 10 feet, an unrestrained child, a tourniquet on a limb. The time rule is the one to respect. A helicopter requested after you have packaged the patient often lands after you could have driven, so decide during your first two minutes on scene, and if ground is faster, go.

FROM THE DEN Rotor wash turns anything loose into a projectile: flares, blankets, backboard straps, and your partner's hat. Clear the zone like you would want it cleared if you were the one landing.

CHAPTER 30

The Multi-Casualty Incident

Do the most good for the most people. That means not doing everything for the first person you see.

#151 #125 Policy #210

THE RULE · DEFINITIONS #151

- **MCI Level I:** 5 to 10 patients; a sudden event that can overwhelm any part of the EMS system or the usual initial response.
- **MCI Level II:** more than 11 patients (as printed); needs resources from neighboring counties.
- During a declared MCI, Policy #210 (Multi-Casualty Field Incident Operations) governs destination.
- **MedCom must be notified**; MedCom contacts the hospitals for how many and which category of patients each can take and relays that to the scene.

THE RULE · DEATH IN AN MCI #125

- Use the **START** adult and **JumpSTART** pediatric triage algorithms.
- Base contact is **not** needed to withhold resuscitation or determine death during an MCI.
- Apply a **black** tag with the time of the initial evaluation and the findings.

START (adults) ABOUT 30 SECONDS PER PATIENT

WALKING?
Yes: GREEN (minor). Direct them to a collection point.

BREATHING?
No: open the airway. Still no: BLACK. Starts breathing: RED.

RATE
Over 30 per minute: RED.

PERFUSION
No radial pulse, or capillary refill over 2 seconds: RED. Control major bleeding.

MENTAL STATUS
Cannot follow simple commands: RED. Otherwise: YELLOW (delayed).

JumpSTART (children)

WALKING?
Yes: GREEN. Infants and children who cannot walk get a full JumpSTART assessment.

BREATHING?
No: position the airway. Breathing: RED. Still no: check a pulse. No pulse: BLACK.

RESCUE BREATHS
Pulse but apneic: give **5 rescue breaths**. Breathing: RED. Still apneic: BLACK.

RATE
Under 15 or over 45, or irregular: RED.

PULSE AND AVPU
No palpable peripheral pulse: RED. Pain with inappropriate response (posturing, noises) or unresponsive: RED. Otherwise: YELLOW.

THE WHY · CHILDREN BREATHE-ARREST FIRST

Children usually stop breathing before their hearts stop, so an apneic child with a pulse may be rescued with a few breaths. That is the one place JumpSTART spends extra seconds that START does not.

PEARL · ONLY TWO TREATMENTS DURING TRIAGE

While triaging, you only open airways and control major bleeding (a tourniquet or a bystander's hands on the wound). Everything else waits for the treatment area. Triage is repeated: tags change as patients improve or decline, and the first tag is a starting point.

PITFALL · THE FIRST PATIENT TRAP

The first crew on scene at an MCI does not treat. It sizes up, declares the MCI, requests resources, establishes command, notifies MedCom through dispatch per your agency's procedure, and starts triage. The urge to start CPR on the first patient you see is strong and will cost other lives. Stay in the role you are given.

FROM THE DEN If they can walk, they're green. If they can walk over to complain about being green, they're very green. And in an MCI, walking past the first patient is the heroic move.

PART

09

Handoff & the Chart

The patient is not done when you stop the bleeding. They are done when the next team knows what you know.

31 Handoff and Documentation

COUNTY DOCUMENTS IN THIS PART #124 · #153 · #702 · #706 · #714

CHAPTER 31

Handoff and Documentation

The trauma team cannot treat what you did not tell them. The chart is the part of your care that lasts.

#124 #125 #153 #702 #706 #714 #661

The bedside handoff MIST IN 60 SECONDS

The radio report (Chapter 29) gets the room ready. The bedside handoff gets the facts into the heads of the people who will now own the patient. In a trauma bay, a short, structured handoff with the room quiet is safer than a long story told while everyone is moving the patient.

SAY IT · MIST HANDOFF

Mechanism: "Restrained driver, T-bone at about 40, driver side intrusion, 15-minute extrication."
Injuries: "Left chest wall tenderness, decreased sounds left, open left femur."
Signs: "First pressure 84 over 50, now 98 over 60; heart rate 128 to 116; GCS 14, E4 V4 M6."
Treatment: "Left needle decompression at 0942 with air return. 500 of saline. TXA started 0950. Tourniquet left thigh at 0938. Fentanyl 50 at 0952."

THE TIMES THEY NEED

- **Time of injury** (for TXA and surgical planning).
- **Tourniquet time**: written on the device and told to staff #706.
- **TXA start time**: hospitals often follow with a second gram #714.
- **Total fluid** given, and when.
- **Every medication** with dose and time.
- **Anticoagulant** name and last dose.
- Needle decompression side, site, and time, and whether it worked.

PEARL · HANDS OFF, EYES UP

If the patient is stable enough, ask "Can I have 30 seconds?" and give MIST before the transfer to the bed, while the team is listening rather than working. If the patient is crashing, move them first and give the report to the team leader as soon as they are on the bed. Always finish with one sentence: "My biggest worry is ____." Then stay a moment for questions. A good handoff is short, ordered, and finished with what you are worried about.

PITFALL · THE REPORT THAT DOES NOT MATCH THE CHART

The radio said "Step 1, SBP 84," the bedside report said "pressure has been fine," and the chart lists only the last set of vitals. Now nobody knows whether the patient was ever hypotensive. Say and write the **worst** numbers and the trend, not just the latest.

Charting trauma well

The companion Bearamedics guide, *The G.O.L.D. Standard*, teaches the full narrative structure for SLO County charting (Gather, Observe, Link, Do and Document) built around the elements Policy #124 requires. This page is the trauma-specific layer on top of it: the details that matter only, or most, in trauma.

AREA	DOCUMENT
Mechanism	What hit what, how fast (estimated), where the patient was, restraints and airbags, helmet, intrusion (inches, where), ejection, extrication time, steering wheel or windshield damage, fall height and landing surface, type of weapon as reported. Describe what you saw, not your conclusion ("starred windshield on the passenger side," not "bad crash").
Triage	Which step criteria were met and the exact finding ("Step 1: SBP 84"), time of the alert or consult, who you spoke with, and the destination decision #153.
Bleeding	Tourniquet: location, time on (also written on the device), who placed it (bystander, first responder, you), reassessment for absent distal bleeding, and improvised tourniquets removed #706. Packing: what, where, how long held. Estimated blood loss on scene.
TXA and fluids	Indication met, time of injury, start time, and that it was mixed in 100 mL and infused over 10 minutes #714. Fluid volumes, the trigger, and the response #660.

AREA	DOCUMENT
Airway and chest	Method, size, attempts, confirmation with waveform capnography plus a second method, EtCO2 values #602. Needle thoracostomy site, side, gauge, result #705. In traumatic arrest, **why** an ALS airway was not placed if it was not #661.
SMR	Indication (or why SMR was not indicated), the method, and **how the patient was moved, secured, and transported**; any alternate SMR precautions taken #702.
Neuro	GCS by component with each set, pupils, motor and sensation in all four limbs before and after moves and splints.
Pain	Score before and after each dose, and the reason for any medication you chose not to give.
Restraints	Why and when they were applied, who applied them, pulse, capillary refill, color, motor, and sensation in each restrained limb every 15 minutes, and respiratory status. Soft or padded quick-release restraints only; never prone, never hands and feet tied together behind the patient. Remember that aggression can be a head injury #711.
Death	Per #125: the circumstances of non-initiation or termination, physical exam findings (heart and lung sounds, pupils, skin, ECG and capnography if available), measures performed and results, the name of the EMS provider terminating or the base physician who pronounced, and the time #125. MCI: a black tag with the time of evaluation and findings.

THE UPLOAD CLOCK #124

ePCR completed and available after transfer of care: **60 minutes** for Step 1 or Step 2 trauma (and for cardiac arrest or ROSC, STEMI, stroke alerts, and any Code 3 transport); **2 hours** for everything else; **12 hours or end of shift** for non-transports. The trauma team often reads your chart while the patient is still in the bay or the OR.

PEARL · FORENSIC AWARENESS

- Cut clothing **around**, not through, bullet and stab holes when you can.
- Describe wounds by location, size, and shape. Do not label them "entrance" or "exit"; that is a forensic determination.
- Leave clothing and items with the patient or law enforcement per your agency; paper bags, not plastic.
- Write down what you moved at a scene and why.
- Quote the patient and bystanders exactly, with who said it.

PITFALL · PHRASES THAT HURT YOU LATER

"No LOC" when nobody knows (write "patient does not recall the event; bystander reports he was talking immediately"). "WNL" for a trauma exam. "Patient refused SMR" without the risks you explained, their capacity, and who witnessed it (Policy #203). "Combative" without what the patient did and what you checked for first (hypoxia, low pressure, low sugar, head injury). Write what you saw and did, in plain words.

FROM THE DEN WNL stands for "within normal limits." Every QA reviewer on earth reads it as "we never looked." Write what you actually found.

PART

10

Scenarios & Self-Test

Ten calls to run in your head, then thirty questions to prove it stuck.

32 Ten Calls to Run in Your Head

33 Self-Test

COUNTY DOCUMENTS IN THIS PART All of the above



★ ★ ★ ★ ★

CHAPTER 32

Ten Calls to Run in Your Head

Read the call, cover the gold box, and say your plan out loud before you check it.

#153 #660 #661 #705 #706 #714 #125

Locations are used only to practice the El Campo Road destination rule #153. Patients and details are invented. Weights are given so you can do the math.

Case 1 · Ejected on the 101

BLUNT · CHEST · HEAD · ATASCADERO

Midnight rollover on Highway 101 north of Atascadero. A 28-year-old man, about 80 kg, was ejected and lies 20 feet from the car. He moans to pain and localizes. Respirations 34 and shallow, SpO2 86% on room air, HR 132, BP 82/50. The left chest has bruising and crepitus, breath sounds are absent on the left, neck veins are distended. A scalp laceration oozes. Pupils equal.

1. What is his triage category and where is he going? 2. What do you fix on scene, in what order? 3. What happens en route? 4. What is the trap in his head injury?

RUN IT

1. **Trauma Alert.** Step 1 three times over (GCS 13 or less, SBP under 90, RR over 29) plus Step 3 (ejection). North of El Campo Road: **Sierra Vista**. Off scene in 10 minutes or less #153.
2. No massive external bleeding, so airway with manual in-line stabilization, high-flow oxygen, then the chest: falling pressure, absent sounds, JVD, and hypoxia mean **tension pneumothorax**. Left needle thoracostomy, 2nd ICS midclavicular or 4th ICS midaxillary, maximum 10 Ga, over the top of the rib, one-way valve, reassess #705. SMR is indicated (altered mental status) #702. Package and go.
3. Two large-bore lines; NS up to 500 mL for SBP 90 or less, repeat once, base for more #660. TXA 1 g in 100 mL over 10 minutes: blunt trauma with SBP 90 or less, adult, within 3 hours, not an isolated head injury #714. Reassess the needle if he worsens. Radio update 5 minutes out.
4. He has a head injury **and** hypotension: no permissive hypotension here. Treat the pressure at the trigger, keep SpO2 at 94% or higher, and if you bag him, target EtCO2 35 to 45 BTF 2023.

Case 2 · The thigh that will not stop

PENETRATING · EXTREMITY · NIPOMO

Nipomo, a single gunshot wound to the upper inner left thigh of a 19-year-old, about 70 kg. Bright red blood is pulsing through his jeans and pooling. He is pale and anxious, GCS 15, HR 128, BP 92/60. Law enforcement has the scene secured.

1. First 30 seconds? 2. The first tourniquet is on and he is still bleeding. Now what? 3. Does he get TXA? 4. Pain control? 5. Destination and the one time you must not forget?

RUN IT

1. Hands on the wound with direct pressure while your partner places a tourniquet **2 to 4 inches above the wound**, not over a joint; tighten until the bleeding stops and the distal pulse is gone **#706**.
2. Tighten further, then add a second tourniquet just above the first; large thighs often need two. A wound too high for a tourniquet gets hemostatic gauze packed into the wound with firm pressure (Chapter 6) **#706**.
3. With bleeding **controlled** and SBP 92, he does not meet #714 yet (SBP 90 or less, or ongoing bleeding not controlled by tourniquet). Reassess every few minutes: if the pressure drops to 90 or the bleeding continues, he qualifies **#714**.
4. **Ketamine.** His pressure is above 90, but he has lost a lot of blood and his heart rate is 128. The fentanyl formulary lists significant hemorrhage and shock as contraindications, and the ketamine formulary makes ketamine first-line with evidence of hemorrhagic shock. Ketamine 0.3 mg/kg (about 21 mg, max 30 mg) in 100 mL over 10 minutes, or 0.5 mg/kg IM (max 40 mg) without a line **#603**. Fentanyl is the usual choice for an isolated fracture with normal vitals; this is not that patient.
5. **Trauma Alert**, Step 2 (penetrating injury proximal to the knee). South of El Campo Road: **Marian**. Write the tourniquet time **on the device** and tell the receiving staff **#706**.

Case 3 · Grandma and the blood thinner

GERIATRIC · HEAD · PASO ROBLES

An 82-year-old woman, about 55 kg, tripped on a rug at home in Paso Robles and struck her forehead. GCS 15 and at her baseline per her daughter. She has a 3 cm forehead laceration, a deformed right wrist, and mild neck pain. She takes apixaban (last dose this morning) and metoprolol. HR 64, BP 138/76.

1. Does #153 require a Trauma Consult? 2. Does she need SMR? 3. Pain? TXA? 4. What two things must the receiving team hear?

RUN IT

1. She meets Step 4 considerations (over 65, anticoagulant with a head injury), but the county note says a consult is **not required for ground-level falls with GCS 14 or more** **#153**. Provider judgment (Step 4a) still lets you call one. Without one, transport to the appropriate ED and say "anticoagulated head strike" early.
2. **Yes.** Age 65 or older with any spinal-area pain **#702**. A collar and a padded cot, positioned for her comfort and curvature.
3. Splint the wrist, then fentanyl starting at **25 mcg** for an older adult, reassess **#603**. No TXA: isolated head injury is a contraindication and she is not in shock **#714**.
4. The anticoagulant **name and the time of the last dose**, and her baseline mental status. Then ask the question that changes the call: "Did anything happen right before you fell?" A beta blocker means her heart rate will not warn you, and syncope makes this a medical call too.

Case 4 · The child in the crosswalk

PEDIATRIC · MULTISYSTEM · MORRO BAY

Morro Bay. A 7-year-old boy, about 24 kg, was struck by an SUV at an estimated 25 mph and thrown about 10 feet. He cries but answers questions slowly (GCS 14). HR 150, RR 30, BP 80/50, capillary refill 4 seconds, skin pale and cool. Tire mark bruising over the left upper abdomen; the right thigh is deformed and swollen.

1. Alert or consult, and why? 2. Fluid dose? 3. Pain medication? 4. TXA? 5. What does his heart rate tell you?

RUN IT

1. **Trauma Alert**, Step 1: his SBP of 80 is under the minimum for age (70 + 2 × 7 = **84**), and he has poor perfusion. Step 3 too (pedestrian thrown, over 20 mph). He is pediatric by weight (34 kg or less). Sierra Vista **#153**.
2. NS **20 mL/kg = 480 mL** (max 500), reassess, may repeat once if no change in SBP **#660**.
3. No standing-order analgesic fits him right now. He does not meet #603 acute pain criteria (pressure below the age minimum, GCS not normal for age), fentanyl's formulary contraindications include shock and significant hemorrhage, and ketamine is not allowed in children. Splint the femur, which reduces both bleeding and pain, comfort him, and contact base if he needs pain control. For a child with an isolated fracture and normal perfusion, the dose would be fentanyl 1 mcg/kg IV (max 34 mcg per dose) or 1.5 mcg/kg IN **#603**.
4. No. TXA is not for patients under 15 **#714**.
5. HR 150 is below his Step 1 heart-rate threshold (over 160 at this size), but a child this pale with a low pressure is already decompensating. In children, hypotension is a pre-arrest sign: **move now**, ventilate early if he tires, and keep him warm.

Case 5 · Thirty weeks and a seatbelt

OBSTETRIC · BLUNT · SANTA MARGARITA

A 31-year-old woman, 30 weeks pregnant, was the restrained driver in a frontal crash at about 35 mph with airbag deployment. The lap belt was across her belly. She has abdominal pain, a firm, tender uterus, and a small amount of vaginal bleeding. HR 118, BP 104/66, SpO2 97%, GCS 15. No neck or back pain.

1. Triage? 2. Positioning? 3. What injury are you worried about and why does her pressure not reassure you? 4. Medications?

RUN IT

1. Step 4: pregnancy over 20 weeks. **Trauma Consult** with the SLO Trauma Center; give the ETA to the trauma center and to the closest ED **#153**.
2. No SMR criteria, so **left lateral** position for transport **#660-A**. If she needed SMR, tilt the cot or manually displace the uterus to the left.
3. **Placental abruption**: belly pain, a firm tender uterus, bleeding, and tachycardia. Her blood volume is up 40 to 50%, so she can lose a large volume before her pressure falls, and the placenta has no autoregulation: the fetus is in trouble first. Third-trimester bleeding means transport early **#650**.
4. Oxygen per #602 and do not let her become hypoxic. Line in; no fluid bolus unless she meets the #660 trigger. Pain: fentanyl by criteria; **ketamine is contraindicated in pregnancy** **#603**. No TXA indication today (SBP over 90, no uncontrolled external bleeding), and pregnancy is a formulary precaution.

Case 6 · Pulled from the bedroom

BURNS · INHALATION · LOS OSOS

Fire crews carry a 45-year-old man, about 90 kg, out of a smoke-filled house. He has partial-thickness burns to the face, the front of the chest, and both arms, circumferential on both forearms. Soot in the mouth, singed nasal hair, a hoarse voice. He is confused (GCS 14). HR 112, BP 128/80, RR 24, SpO2 99%.

1. Estimate the TBSA. 2. Cool running water? 3. What does the SpO2 of 99% mean? 4. Airway plan? 5. Destination thinking?

RUN IT

1. Both arms (18%) + front of chest (about 9%) + face (about 4.5%) = roughly **30%**, all partial thickness.
2. **No.** CRW is for burns under 30% BSA with **no inhalation injury**, and he has inhalation injury. Remove smoldering clothing and jewelry, then dry sterile dressings or a sheet, and keep him warm #633.
3. Nothing reassuring. A closed-space fire with confusion means **carbon monoxide** (and possibly cyanide) until proven otherwise, and the pulse oximeter reads falsely normal. High-flow oxygen by nonrebreather for his symptoms; ignore the reassuring number #602.
4. Soot, singed hair, and hoarseness mean swelling that will get worse. ETI is the gold standard for the burned airway #633; decide early, notify early, and make the first attempt the best one. Pain per #603 (altered mental status moves fentanyl to base). NS up to 500 mL may be considered #633.
5. He meets several burn center criteria (face, partial thickness over 10%, inhalation). Consider Policy #155 for direct air transport to a burn center; the nearest ABA-verified center is in Fresno, and the Grossman Burn Center in Bakersfield is closed. Decide with base.

Case 7 · Warm and slow on Highway 1

SPINAL · SHOCK · CAMBRIA

Highway 1 near Cambria. A 32-year-old helmeted motorcyclist went down at about 45 mph. He is awake and talking but cannot move his arms or legs. He breathes with his belly. HR 52, BP 76/40, skin warm and pink below the nipple line, pale above. No obvious external bleeding; the pelvis and belly look normal.

1. Triage? 2. What kind of shock is this, and what do you rule out first? 3. Treatment ladder? 4. TXA?

RUN IT

1. **Trauma Alert**: Step 1 (SBP under 90), Step 2 (paralysis), and Step 3 (motorcycle over 20 mph). North of El Campo Road: Sierra Vista. Cambria is a long drive; think about air early under Policy #155 #153.
2. Low pressure, slow pulse, warm skin below the injury: **neurogenic shock**. But it is a diagnosis of exclusion. Look hard for bleeding (pelvis, belly, femurs, chest) because a cord injury hides the usual signs.
3. SMR #702. Support ventilation early: belly breathing means the intercostals are gone and the diaphragm may follow (C3 to C5). NS up to 500 mL, repeat once #660. Still hypotensive: base for **push-dose epinephrine** 10 mcg/mL, 1 mL every 1 to 3 minutes to SBP over 90 #660. Keep him warm.
4. If the hypotension is the cord alone, TXA is contraindicated (**isolated spinal shock**) #714. If you find signs of bleeding, the hemorrhage indication applies. When unsure, ask base.

Case 8 · He was talking when you got there

TRAUMATIC ARREST · SAN LUIS OBISPO

San Luis Obispo, about 6 minutes from Sierra Vista. A 24-year-old was stabbed once in the left chest at the 4th intercostal space, just left of the sternum. On your arrival he is talking, pale, HR 140, BP 70 by palpation, neck veins distended, breath sounds present on both sides. As you load him he goes unresponsive and pulseless; the monitor shows PEA at 110.

1. What are you thinking? 2. What does #661 tell you to do now? 3. What do you not give? 4. What changes if he had been pulseless with fixed pupils and no heart sounds when you arrived 20 minutes after the stabbing?

RUN IT

1. A wound in the cardiac box, hypotension, JVD, and equal breath sounds: **cardiac tamponade** until proven otherwise, with hemorrhage and tension still on the list. This needs a surgeon in minutes.
2. He arrested **after EMS arrival** and is under 20 minutes from a trauma center: **do not delay transport**. HPCPR with interruptions under 5 seconds, airway and ventilation by the least invasive effective method, **bilateral needle thoracostomy** (suspected chest trauma), NS up to 500 mL repeated once if no ROSC **#661** **#705**. Alert Sierra Vista early so the surgeon is waiting.
3. No epinephrine or amiodarone (no suspicion of medical origin) **#661**. No TXA after more than 5 minutes of CPR without ROSC **#714**. Consider not using the AED in traumatic arrest **#708**.
4. Absent signs of life on EMS arrival: consider non-initiation per #125. Document the findings (pulse, breathing, heart and lung sounds, pupils, rhythm if ALS), the time, and preserve the scene for law enforcement **#125**. If no ALS airway was placed in a resuscitation, document why **#661**.

Case 9 · The bus on Highway 46

MCI · START · JUMPSTART

A tour bus and a pickup collide on Highway 46 East. You are the first ambulance. Fire reports about 14 patients. You are assigned to triage. Tag these five:

A. A woman walking around holding a bleeding forearm. B. A man sitting against the bus breathing 36 times a minute. C. A man not breathing; after you reposition his airway he starts breathing. D. A woman with a deformed femur: RR 22, radial pulse present, capillary refill 1.5 seconds, follows commands. E. A 6-year-old who is not breathing after airway positioning but has a pulse; 5 rescue breaths produce no breathing.

1. MCI level and first notifications? 2. Tag A through E. 3. Two treatments you may do during triage?

RUN IT

1. About 14 patients: **MCI Level II** (more than 11). Policy #210 governs destination; **MedCom** is notified and polls hospitals for capacity **#151**. Size up, declare, request resources, establish command or report to it, then triage.
2. A **Green** (walking). B **Red** (RR over 30). C **Red** (breathing only after repositioning). D **Yellow** (cannot walk, but breathing under 30, perfusing, and following commands). E **Black** (JumpSTART: apneic despite 5 rescue breaths). Black tags carry the time and findings; base contact is not needed for death in an MCI **#125**.
3. Open airways and control major bleeding (tourniquet or a bystander's hands). Everything else waits for the treatment area.

Case 10 · The diver who came up fast

SCUBA · ENVIRONMENTAL · AVILA BEACH

Avila Beach. A 40-year-old woman ran low on air at 60 feet and made a rapid ascent. Within two minutes of surfacing she became confused, with right arm weakness and chest pain. RR 24, SpO2 93%, HR 108, BP 132/84. Her dive buddy has her dive computer.

1. What is the likely problem? 2. Oxygen and position? 3. What is contraindicated? 4. What do you bring, and where might she go?

RUN IT

1. Neurologic signs within minutes of a rapid ascent: **arterial gas embolism**, with pulmonary barotrauma possible. Decompression sickness usually develops over minutes to hours.
2. **100% oxygen by nonrebreather regardless of SpO2**, supine unless she is vomiting or cannot tolerate it, frequent neuro exams, address hypothermia #634.
3. **CPAP** is generally contraindicated (barotrauma risk) #634. Watch for tension pneumothorax; needle thoracostomy if tension physiology develops #705. NS up to 500 mL for possible dehydration.
4. The **dive computer** (max depth, time, ascent rate, number of dives, gas), without delaying transport. Consider Policy #155 for direct air transport to a hyperbaric chamber; DAN (919-684-9111) can support the receiving physician #634.

CHAPTER

33 Self-Test

Thirty questions. No peeking. Anything you miss tells you which chapter to read next.

#153 #603 #633 #660 #661 #702 #705 #706 #713 #714

1. In SLO County, pediatric protocols apply to a patient who weighs:

A. 40 kg or less
B. 34 kg or less
C. 25 kg or less
D. Any patient under 15 years

2. Which finding alone makes an adult a Step 1 Trauma Alert?

A. GCS 14
B. Respiratory rate 28
C. SBP 88
D. Heart rate 125

3. A 72-year-old after a car crash has an SBP of 104. Per #153, this is:

A. A Step 1 alert
B. A Step 4 consideration; SBP under 110 may represent shock
C. Normal for age; no criteria
D. A Step 2 alert

4. A Step 2 patient on a scene south of El Campo Road goes to:

A. Sierra Vista
B. Marian Regional Medical Center
C. The closest ED
D. Whichever the base chooses

5. Who may request a Trauma Consult?

A. Any EMT
B. ALS only
C. The engine captain
D. Dispatch

6. For an adult, which fall meets Step 3?

A. Over 10 feet
B. Over 15 feet
C. Over 20 feet
D. Any fall with a head strike

7. Where does the county place a tourniquet?

A. Directly over the wound
B. 2 to 4 inches proximal to the wound, not over a joint
C. Just distal to the wound
D. Over the nearest joint for leverage

8. A tourniquet may be removed in the field by:

A. Any ALS provider once bleeding stops
B. ALS with base consult only
C. No one, ever
D. An EMT after 2 hours

9. The adult TXA dose is:

A. 1 g slow IV push
B. 2 g in 100 mL over 10 minutes
C. 1 g in 100 mL over 10 minutes, no repeat
D. 1 g over 8 hours

10. Which is a TXA contraindication?

A. Age 16
B. SBP 86 after blunt trauma
C. Injury 3.5 hours ago
D. A penetrating torso wound

11. Adult trauma fluid for SBP 90 or less:

A. 1 L wide open
B. NS up to 500 mL, may repeat once
C. 250 mL boluses to 2 L
D. 20 mL/kg

12. Pediatric (34 kg or less) trauma fluid:

A. 10 mL/kg, max 250 mL
B. 20 mL/kg, max 500 mL, may repeat once
C. 20 mL/kg, max 1 L
D. 40 mL/kg

13. County sites for needle thoracostomy:

A. 2nd ICS midclavicular or 4th ICS midaxillary
B. 5th ICS midclavicular
C. 2nd ICS anterior axillary only
D. Just below the rib

14. The maximum catheter size for needle thoracostomy and needle cric is:

A. 14 Ga
B. 12 Ga
C. 10 Ga
D. 16 Ga

15. CPAP is not used in trauma patients with:

A. Rib pain without other findings
B. Major facial, head, or chest trauma, or signs of pneumothorax
C. SpO2 92%
D. Mild wheezing

16. Pelvic binder indications are:

A. Any MVC
B. High-risk mechanism + pelvic, low back, or groin pain + SBP 90 or less
C. Pelvic pain alone
D. An isolated hip fracture

17. The binder is centered over the:

A. Iliac crests
B. Greater trochanters
C. Umbilicus
D. Mid-thigh

18. A 70-year-old after a fall needs SMR when she has:

A. Only midline tenderness
B. Any spinal-area pain
C. Only a neurologic deficit
D. Never; age is not a criterion

19. A penetrating neck wound with a normal neuro exam gets:

A. Full SMR with a collar
B. No SMR unless a neurologic deficit is present
C. A collar only
D. A long board

20. Traumatic arrest after EMS arrival, 8 minutes from a trauma center:

A. Work 20 minutes on scene
B. Do not delay transport; NS; bilateral needles if chest trauma; no epi or amiodarone unless medical origin
C. Epinephrine every 3 to 5 minutes
D. Call base for termination

21. Traumatic arrest after EMS arrival, more than 20 minutes from a trauma center or hospital:

A. Terminate on scene
B. Contact the SLO Trauma Center for treatment and destination
C. Transport to the trauma center without contact
D. Treat as a medical arrest

22. For the AED in traumatic arrest, #708 says:

A. Always apply it first
B. Consider not using it unless the trauma may be secondary to a cardiac event
C. Use it only in children
D. Shock every 2 minutes

23. START: an adult breathing 34 times a minute is tagged:

A. Green
B. Yellow
C. Red
D. Black

24. JumpSTART: a child is apneic with a pulse after airway positioning. Next:

A. Black tag
B. 5 rescue breaths
C. 2 rescue breaths
D. Start CPR

25. For a ventilated TBI patient without signs of herniation, target EtCO2 is:

A. 25 to 30
B. 30 to 35
C. 35 to 45
D. 45 to 55

26. Cool running water for burns under #633:

A. 10 minutes for all burns
B. 20 minutes cumulative, for non-electrical burns under 30% BSA with no inhalation injury
C. Ice packs for 20 minutes
D. Only for burns over 30%

27. Ketamine is contraindicated in:

A. Rib fractures
B. Pregnancy
C. Hypotension
D. Opioid tolerance

28. Adult IV fentanyl for trauma pain:

A. 50 to 100 mcg slow over 1 minute, repeat after 5 minutes, max 200 mcg
B. 1 mcg/kg, max 50 mcg
C. 200 mcg once
D. 25 mcg every minute to effect

29. In drowning, resuscitate every patient with a known submersion time of:

A. 10 minutes or less
B. 25 minutes or less, regardless of water temperature
C. 60 minutes or less
D. Any time, but only in cold water

30. For a Step 1 trauma patient, the ePCR must be available within:

A. 15 minutes of arrival
B. 60 minutes after transfer of care
C. 2 hours
D. End of shift

Answer key CHECK AFTER YOU FINISH

1 · B 34 kg or less; use a length-based tape #601

2 · C SBP under 90. GCS must be 13 or less; RR under 10 or over 29 #153

3 · B Over 65, SBP under 110 may represent shock (Step 4) #153

4 · B South of El Campo Road: Marian #153

5 · B Only ALS may request a consult #153

6 · C Adults over 20 ft; children over 10 ft or twice their height #153

7 · B 2 to 4 inches proximal; avoid joints, fractures, and the wound #706

8 · B Base consult only, when misplaced or no longer needed #706

9 · C 1 g in 100 mL NS over 10 minutes, no repeat #714

10 · C More than 3 hours after injury #714

11 · B Up to 500 mL, repeat once; more by base #660

12 · B 20 mL/kg, max 500, repeat once if no change #660

13 · A Over the top of the rib #705

14 · C Maximum 10 Ga #705 #704

15 · B Plus SCUBA patients generally #703 #634

16 · B All three are required #713

17 · B At the trochanters; crests are too high #713

18 · B 65 and older: any spinal-area pain #702

19 · B No SMR for penetrating trauma without deficit #702

20 · B Under 20 min: load and go, treat en route #661

21 · B Over 20 min: SLO Trauma Center contact #661

22 · B Consider not using it in trauma #708

23 · C RR over 30 is red #125

24 · B 5 breaths; breathing red, apneic black #125

25 · C 35 to 45; about 10 breaths per minute in adults BTF

26 · B Cumulative, counting bystander time #633

27 · B Also schizophrenia, hypertensive emergency, ACS, children #603

28 · A Consider 25 mcg over 65 #603

29 · B Hypoxia is the reversible cause #632

30 · B Step 1 or 2: 60 minutes; others 2 hours #124

PEARL · SCORING

27 or more: you are ready to teach this to the next intern. 22 to 26: reread the chapters you missed and retake it in a week. Under 22: work one part a shift and run the cases with your preceptor. Missed 2, 3, or 6? Reread Chapter 29; triage is the most tested thing on the radio.

FROM THE DEN Missed a few? Good. Paper is the cheapest place in EMS to be wrong. The 101 at 0300 is the most expensive.

APPENDIX

A

Trauma Drug Quick Reference

County doses for the drugs you will reach for on a trauma call. Confirm against the current page before you rely on them.

#603 #633 #660 #661 #710 #714 Formulary

DRUG	ADULT	PEDIATRIC (34 KG OR LESS)	NOTES · BASE
Normal saline (trauma)	Up to 500 mL IV/IO for SBP 90 or less or no palpable peripheral pulses; may repeat once	20 mL/kg IV/IO, max 500 mL, for hypotension for age; may repeat once if no change in SBP	More: **BASE**. Large bore with saline lock #660
Normal saline (traumatic arrest)	Up to 500 mL; repeat once if no ROSC or SBP under 90	20 mL/kg, reassess and repeat	#661
Normal saline (burns)	Consider up to 500 mL; repeat once for persistent hypotension, or once at ALS discretion if normotensive	20 mL/kg, max 500 mL; same repeats	Not a burn formula #633
Tranexamic acid	1 g in 100 mL NS IV/IO over 10 minutes; no repeat. Age 15 and older, within 3 hours of injury	Not under 15 years	Rate no faster than 100 mg/min. Contraindications in Chapter 9 #714
Fentanyl	IV: 50 to 100 mcg slow over 1 min; repeat after 5 min; max 200 mcg. IM/IN: 50 to 100 mcg (1 mcg/kg guide); repeat after 15 min; max 200 mcg. Consider 25 mcg over 65	IN 1.5 mcg/kg split between nares, or IM 1 mcg/kg; repeat after 15 min. IV 1 mcg/kg slow; repeat after 5 min. Max 4 doses; formulary max 34 mcg per IV/IM dose; max 0.5 mL per nostril #709	Not with SBP under 90, hypoxia, impaired respirations; formulary adds shock and significant hemorrhage. Altered LOC, chronic pain, extra doses: **BASE** #603
Ketamine	0.3 mg/kg (max 30 mg) in 100 mL NS IV/IO over 10 min, one-time; or 0.5 mg/kg (max 40 mg) IM. Additional dose: **BASE**	**Not approved for pediatric patients**	Contraindicated: pregnancy, schizophrenia, hypertensive emergency or dissection, ACS. First line when fentanyl is contraindicated by hypotension #603
Lidocaine (IO pain)	0.5 mg/kg (max 40 mg) slow IO push over 60 seconds, after IO placement	0.5 mg/kg (max 40 mg) slow IO push over 60 seconds	For the conscious patient after IO #710
Push-dose epinephrine	10 mcg/mL: 1 mL IV/IO every 1 to 3 min to SBP over 90	1 mL (0.1 mL/kg if under 10 kg) to age-appropriate SBP	**BASE**, neurogenic shock after fluids. Mix 9 mL NS + 1 mL of 0.1 mg/mL epi #660
Epinephrine drip	1 mg in 1 L NS (1 mcg/mL), start 10 mcg/min for extended transport	1 mcg/kg, not to exceed 10 mcg/min (formulary drip chart)	**BASE** #660
Calcium chloride	1 g slow IV/IO (over 5 minutes in #644)	20 mg/kg slow IV/IO, max 500 mg per dose	**BASE**. Hyperkalemia with instability (crush). Flush the line; precipitates with bicarbonate
Sodium bicarbonate	1 mEq/kg IV/IO; may repeat every 10 min at half the first dose	1 mEq/kg IV/IO	**BASE**. Hyperkalemia with ECG changes refractory to calcium
Ondansetron	4 mg slow IV over 1 min, or 4 mg IM or PO (ODT); may repeat every 20 min, max 12 mg total	**BASE** only (34 kg or less)	Pregnancy: **BASE**. QT prolongation; a fast IV push can cause dizziness, hypotension, or syncope #615
Morphine	Only on the county medical director's order when fentanyl is unavailable	Same	Contraindicated in head injury and multisystem trauma
Albuterol + ipratropium	Albuterol 2.5 to 5 mg with ipratropium 500 mcg (HHN, mask, CPAP, BVM); ipratropium repeat once after 20 min	Albuterol 2.5 to 5 mg with ipratropium 250 mcg (HHN, mask, BVM)	Wheezing after burns or smoke #633
Oxygen	Simplest method to SpO2 94% or higher	Same	SCUBA: 100% NRB regardless of SpO2 #634. Suspected CO: high-flow O2 for symptoms; the oximeter reads falsely normal #602

PITFALL · NOT STANDING ORDERS IN TRAUMA

Epinephrine and amiodarone in traumatic arrest unless medical origin is suspected #661; ketamine at dissociative (sedation) doses; TXA under 15; calcium and bicarbonate (base only).

PEARL · LABEL EVERY BAG

TXA and ketamine both run as 100 mL bags over 10 minutes. Label both with the drug, dose, and start time.

APPENDIX

B

Pediatric Reference

Do the math before the call. Use a length-based tape on the call.

#601 #601-A #153 #603 #660

NORMAL RANGES BY AGE (GENERAL REFERENCE)

AGE	HR AWAKE	RR
Newborn	100 to 205	30 to 53
Infant (to 1 yr)	100 to 180	30 to 53
Toddler (1 to 2)	98 to 140	22 to 37
Preschool (3 to 5)	80 to 120	20 to 28
School age (6 to 11)	75 to 118	18 to 25
Adolescent (12 to 15)	60 to 100	12 to 20

Ranges as taught in AHA Pediatric Advanced Life Support. These describe normal children; the county's triage thresholds are on the right and are what drive alerts.

COUNTY HYPOTENSION AND TRIAGE VALUES #153 #601-A

AGE	SBP UNDER	AGE	SBP UNDER
Newborn	60	**6 yr**	82
Infant	70	**7 yr**	84
1 yr	72	**8 yr**	86
2 yr	74	**9 yr**	88
3 yr	76	**10 yr**	90
4 yr	78	**11 to 14**	90
5 yr	80		

Also Step 1: GCS 13 or less · poor perfusion · RR over 60 or respiratory distress; under 20 if under 1 year · HR under 80 or over 180 (5 and under, under 22 kg) · HR under 60 or over 160 (6 and up, 23 to 34 kg).

Weight-based quick doses

WEIGHT	NS 20 ML/KG (MAX 500)	FENTANYL IN 1.5 MCG/KG	IN VOLUME AT 50 MCG/ML (EACH SIDE)	FENTANYL IV/IM 1 MCG/KG	PUSH-DOSE EPI (BASE)	BLOOD VOLUME (80 ML/KG)
5 kg	100 mL	7.5 mcg	0.15 mL (0.08)	5 mcg	0.5 mL (5 mcg)	400 mL
10 kg	200 mL	15 mcg	0.3 mL (0.15)	10 mcg	1 mL (10 mcg)	800 mL
15 kg	300 mL	22.5 mcg	0.45 mL (0.23)	15 mcg	1 mL	1,200 mL
20 kg	400 mL	30 mcg	0.6 mL (0.3)	20 mcg	1 mL	1,600 mL
25 kg	500 mL	37.5 mcg	0.75 mL (0.38)	25 mcg	1 mL	2,000 mL
30 kg	500 mL (cap)	45 mcg	0.9 mL (0.45)	30 mcg	1 mL	2,400 mL
34 kg	500 mL (cap)	51 mcg	1.0 mL (0.5)	34 mcg	1 mL	2,720 mL

Check the concentration on your vial; 50 mcg/mL is the usual fentanyl concentration. Split IN doses between nostrils, no more than 0.5 mL per nostril in children #709. Fentanyl doses repeat by #603 timing up to 4 doses. If no tape is available, a common estimate for ages 1 to 10 is (age × 2) + 8 kg; the county standard is a length-based tape #601.

THE WHY · SMALL NUMBERS, BIG PERCENTAGES

A 10 kg toddler has about 800 mL of blood. A 200 mL loss, a soaked diaper's worth on the floor of a car, is a quarter of it. That is a Class II to III hemorrhage in an adult. Treat every visible pool of blood under a child as a large share of their volume.

PEARL · WEIGHT DECIDES THE PROTOCOL, NOT AGE

The county line is **34 kg** #601. Ask the parent the child's weight, check the tape, and say it on the radio: "Pediatric, 24 kilos." It tells the receiving team which drug doses, which equipment sizes, and which triage numbers you used.

APPENDIX

C

County Items to Verify

Places where county documents disagree, leave a gap, or have changed. Ask about them rather than guess.

#151 #153 #601-A #633 #634 #709

When two county sources disagreed, this book followed the one with the newer effective date (and, with the same date, the protocol over the formulary). These are noted here, not fixed; correcting a county document is the county's job. Bring the list to your FTO, clinical manager, or the EMS Agency. This edition reflects county documents with revisions through 08/07/2026 and has not been reviewed by the SLOEMSA Medical Director; if a county page and this book disagree, the county page is correct.

#	WHERE	WHAT IT SAYS	HOW THIS BOOK HANDLES IT
1	#634 SCUBA (08/07/2026)	Refers to the drowning protocol as "#663."	The drowning protocol is #632; the book cites #632.
2	#601-A (04/15/2017) vs #153 (01/01/2026)	#601-A adult trauma instability uses RR under 10 or **over 30** and pulse over 120. #153 Step 1 uses RR under 10 or **over 29** and has no heart-rate criterion.	Triage follows #153 (newer). A pulse over 120 still marks the patient unstable under #601-A.
3	#153 text vs #601-A and Attachment A (pediatric RR)	The #153 policy text says RR over 60 **or respiratory distress**. #601-A says over 60 **or apnea**. The Attachment A flowchart lists both: "respiratory distress/apnea."	No real conflict; treat any of them as Step 1.
4	#153 pediatric heart rate	Bands are "5 and under (under 22 kg)" and "6 and up (23 to 34 kg)." A child of exactly 22 kg, or a child whose age and weight fall in different bands (a 6-year-old who weighs 20 kg), fits neither cleanly.	Not resolved here. Ask whether age or weight governs; when in doubt, report the heart rate and both values on the radio.
5	#151 Destination (04/15/2017)	MCI Level I is 5 to 10 patients; Level II is "> 11." Exactly 11 patients fits neither.	Not resolved here; follow Policy #210 and incident command.
6	#153 Step 4 note	Step 4 lists anticoagulation with head injury " (excluding minor injuries)," then a note says a consult is not required for ground-level or low-impact falls with GCS 14 or more. "Minor" is not defined.	The book follows the note and reminds you that Step 4a (provider judgment) always allows a consult.
7	Thresholds that differ by one	#153 Step 1 is SBP **under** 90; #660 fluids, #714 TXA, and #713 binder trigger at SBP **90 or less**.	Not an error, but at exactly 90, fluid, TXA, and binder criteria are met while Step 1 is not. Know which number you are using.
8	Burns renumbered	#633 Burns (08/07/2026) replaces the retired #662.	Any card, test, or handout that cites #662 is out of date.
9	Burn center destinations	The Grossman Burn Center in Bakersfield closed June 30, 2026 (Dignity Health public notice). The CA EMSA burn center list cited here is dated 12/2/2025, before the closure.	Any destination list that still names Grossman is out of date. Confirm burn destinations with base and air medical.
10	Hospital names	County documents say "Sierra Vista Regional Medical Center"; the hospital now operates as Adventist Health Sierra Vista.	Same facility, the SLO Trauma Center. The book uses Sierra Vista.
11	#153 Attachment A vs #153 text (Step 4)	Both dated 01/01/2026. The flowchart lists "Age > 65 yrs or < 14 yrs." The policy text says age over 65 (with "SBP under 110 may represent shock") and "Pediatric (34 kg or less)."	Same date, so the policy text governs: the book uses 34 kg, matching every other county pediatric rule. A 14-year-old over 34 kg can still get a consult on provider judgment.
12	Intranasal volume (#709 vs #613, #620, midazolam formulary)	#709 (08/01/2019): up to 1 mL per nostril in adults and 0.5 mL in pediatric patients. #613 and #620 (01/01/2026) and the midazolam formulary page (01/01/2026): pediatric maximum 1 mL per nostril, with 0.2 to 0.3 mL ideal.	Newest date favors 1 mL for pediatric midazolam. Pediatric fentanyl pages are silent, so the book keeps #709's 0.5 mL; the largest pediatric fentanyl IN dose (34 kg) is about 0.5 mL per nostril anyway. Ask whether the 2026 limit now applies to every pediatric IN drug.

APPENDIX

D References and Sources

Where every Evidence box came from, so you can read the original.

COUNTY OF SAN LUIS OBISPO EMS AGENCY (SLOEMSA)

SLOEMSA protocols, procedures, and policies cited by number throughout, from the county compilations *All Protocols 2026 (updated)* and *Formulary 2026 (updated)*, with revisions through 08/07/2026: Protocols #601 (01/01/2026), #601-A (04/15/2017), #602 (01/01/2026), #603 (01/01/2025), #612 to #634 (2019 to 2026; #633 and #634 08/07/2026), #641, #644, #650, #651, #660 and #660-A (08/01/2019), #661 (01/01/2025); Procedures #701 to #718 (#704, #717, #718 01/01/2026), #706-A; Policies #124, #125 (01/21/2026), #151 (04/15/2017), #153 and Attachment A (01/01/2026), #154, #155 EMS Helicopter Operations with Attachments A and B (09/30/2025), #203, #210. Public documents of the County of San Luis Obispo Public Health Department, Emergency Medical Services Agency. slocounty.ca.gov

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A NOTE FROM THE AUTHOR

This book exists because a partner asked for it. Read it, argue with it, and bring your questions to your preceptor. Then write better calls than the ones in here. **Thomas Moore, EMT-P**