WO-01 Stopping the bleeding: pressure, tourniquets, packing and haemostatic plants

HEALING after the FALL, research library, WO-01

Researched 10 October 2026 by Claude Opus agent for THRIVING after the FALL, Book Four. Library document, unverified.

How to read this report

This is the foundation for the book's first trauma protocol. The question is narrow and urgent. A person is bleeding. There is no hospital, no drip, no blood bank and no surgeon. What do the hands, the cloth and the garden do, and what does the evidence say about each?

Figures marked [VERIFY] could not be confirmed from a source I read in full or in abstract. Inches in American sources are converted to centimetres.

One warning frames everything. Almost all modern evidence comes from young soldiers with a surgeon an hour or two away. After the Fall the patient may be a child or a grandmother, and the surgeon may never come.

Findings by section

1. Why bleeding kills, and how fast

Bleeding is the leading preventable cause of death after injury. Of 4,596 United States service members who died in Iraq and Afghanistan from 2001 to 2011, 87.3 per cent died before reaching a medical facility. Of these, 24.3 per cent (976) were judged potentially survivable, and 90.9 per cent of those died of haemorrhage: truncal in 67.3 per cent, junctional (neck, armpit, groin) in 19.2 per cent and limb in 13.5 per cent (Eastridge 2012).

The International Committee of the Red Cross (ICRC) gives a similar picture: haemorrhage causes about half of battlefield deaths, 80 per cent of these bleeds are in the chest or abdomen, and the rest split between neck and limbs, so about one death in ten is a limb bleed that hands and cloth could reach (Giannou and Baldan 2009, chapter 5). The limb bleed is the one a lay person can stop. The torso bleed is the larger share, and no village can stop it. The ICRC table puts 750 mL at about 15 per cent of an adult's blood, implying about 5 litres in all, and loss of more than 2 litres (40 per cent) is class IV shock (Giannou and Baldan 2009, table 8.2).

2. Direct pressure

What the tradition says. Pressing on a wound is universal first aid, older than any written record.

What the record shows. A 2023 joint statement of the American trauma surgeons, emergency physicians and ambulance doctors puts direct pressure first, as controlling most external bleeding (ACS-COT, ACEP and NAEMSP 2023). The ICRC agrees for venous and capillary bleeding (Giannou and Baldan 2009).

What modern science infers. The International Liaison Committee on Resuscitation (ILCOR) reviewed 107 studies with 22,798 patients, all of very low certainty. Manual compression stopped bleeding faster than pressure dressings or devices, tourniquets were associated with lower mortality than manual pressure for limb bleeding, and haemostatic dressings shortened time to haemostasis (Charlton 2021). No randomised trial of pressure itself exists or will.

How long to hold. This is a safety-critical figure, and the sources differ. - Tactical Combat Casualty Care (TCCC) teaches a minimum of 3 minutes of firm pressure over a packed wound, including when haemostatic gauze is used. If bleeding continues, add more gauze and press for another 3 minutes (CoTCCC, TCCC Module 9). - A Stop the Bleed training sheet from a US ambulance operator gives 3 to 8 minutes (Global Medical Response n.d.). - The Austin and Travis County medical directives give 3 minutes [VERIFY: I read this in a search summary, not in the directive itself]. - A UK first-aid trainer advises 10 minutes after control, because a clot takes that long to form (First Aid for Life n.d.). This is a secondary source with no cited study.

Two professional sources agree on a minimum of 3 minutes. The 10-minute figure is plausible but untested. The book should teach 3 minutes as the minimum and 10 as the target, with no lifting to look.

3. Pressure points and elevation

What the tradition says. First-aid manuals long taught pressing the artery upstream (inner arm, groin) and raising the limb.

What the record shows. In 10 volunteers, despite sustained pressure, the pulse beyond returned within 40.6 ± 6.5 seconds at the brachial artery and 20.6 ± 4.7 seconds at the femoral, and the authors called pressure point control "a euphemistic misnomer" (Swan 2009). ILCOR in 2015 found inadequate evidence for pressure points, cold or elevation, and recommended direct pressure (ACEP Now 2016). The European Resuscitation Council no longer recommends elevation or indirect pressure (Zideman 2021, via First Aid for Life n.d. [VERIFY: ERC primary text not retrieved]).

What modern science infers. Not closed. In 35 trained Israeli medics, femoral compression stopped distal flow in 100 per cent within 5.5 seconds and held for 98.7 per cent of 3 minutes (Pikman Gavriely 2023). A review of 9 small studies found flow cessation of 87.5 to 100 per cent but called the evidence inconclusive (Rodgers 2025). Both used ultrasound to confirm success, which a lay rescuer lacks. **Reading**: a trained bridge only, such as a knee in the groin while someone packs. Elevation costs nothing in a simple cut but must never delay pressure or be done on a broken limb.

4. Wound packing

Packing means filling a wound cavity with gauze or cloth, then pressing hard. It is the treatment for junctional wounds where no tourniquet fits.

The TCCC method. Pack tightly so that the gauze extends 2.5 to 5 cm (1 to 2 inches) above the skin, press for at least 3 minutes, and then apply a pressure bandage (CoTCCC, TCCC Module 9). The ICRC adds that, in hospital practice, packing is done with digital pressure on the artery upstream, then a compressive bandage, and the pack is not removed until the patient is in theatre with blood ready (Giannou and Baldan 2009).

Gauze versus cloth. No human trial compares them. Plain packing works mechanically, filling the space, pressing the vessel and giving the clot a scaffold, which clean, tightly woven cotton strips also do. Infection and lint matter less than death in ten minutes.

The surprise. In a pig model of femoral artery injury packed without external pressure, ordinary gauze stopped bleeding in 8 of 8 animals, Combat Gauze (kaolin) in 4 of 8 and Celox (chitosan) in 6 of 8. Blood loss was 260, 374

and 204 mL, a difference that was not significant ($p > 0.3$). Plain gauze was also packed faster (40 against 52 and 59 seconds) (Watters 2011). The packing and the pressure do most of the work.

5. Haemostatic dressings: kaolin, chitosan, and what a village has instead

What they are. Kaolin is a fine clay. It activates factor XII and so starts the intrinsic clotting cascade on contact (QuikClot Combat Gauze). Chitosan is a sugar polymer made from crab and shrimp shells. It carries a positive charge that pulls red cells and platelets together and works even when the clotting cascade is impaired (Celox, HemCon) (PMC9921727 review [VERIFY: authors not recorded]).

What the record shows. In a pig gunshot model with 3 minutes of pressure, blood loss was 11.15 mL/kg with Combat Gauze, 12.19 with a zeolite gauze and 16.8 with standard gauze. Survival did not differ significantly (Wang 2021). A 2023 comparison found most newer agents comparable to Combat Gauze, while one product (BloodSTOP IX) gave only 29 per cent survival (Gerling 2023). ILCOR found haemostatic dressings shortened time to haemostasis compared with standard dressings, with very low certainty (Charlton 2021).

What a village has instead. Potters' white clays are partly kaolin, but dug clay carries tetanus and gas gangrene spores, and no source I found tested a homemade clay or shell powder dressing. The village substitute is plain clean cloth, packed hard and held longer, and the pig data suggest this loses little.

6. Tourniquets

6.1 The military record John Kragh and colleagues studied a combat support hospital in Baghdad for 7 months in 2006 (Kragh 2008, Kragh 2009). Of 2,838 casualties with major limb trauma, 232 (8 per cent) had 428 tourniquets on 309 limbs, and 31 (13 per cent) died. Shock was defined as a weak or absent radial (wrist) pulse. Survival was 90 per cent when the tourniquet went on before shock and 10 per cent after ($P < 0.001$). Prehospital application gave 11 per cent mortality (22 of 194), application in the emergency department 24 per cent (9 of 38), $P = 0.05$. Five patients who needed a tourniquet and had none all died. Transient nerve palsy occurred in 1.7 per cent, and no amputation was caused solely by a tourniquet (Kragh 2009). The pneumatic Emergency Medical Tourniquet worked in 92 per cent and the Combat Application Tourniquet (CAT) in 79 per cent. Tourniquet time showed no association with morbidity up to about 2 hours: fasciotomy was needed in 28 per cent (75 of 272) at 2 hours or less and 36 per cent (9 of 25) beyond, $p = 0.4$ (Kragh 2008). A follow-up of 499 patients with 862 tourniquets replicated the pattern: survival 96 per cent before shock and 4 per cent after, 89 per cent with prehospital application against 78 per cent in hospital ($p < 0.01$), palsy 1.5 to 1.7 per cent (Kragh 2011).

The Israeli experience was more cautious. Over 4 years, 91 of 550 casualties (16 per cent) had tourniquets, 53 per cent of them for situational rather than medical reasons. Ischaemia time averaged 83 ± 52 minutes (range 1 to 305). Effectiveness was 78 per cent, 94 per cent on the arm and 71 per cent on the leg, with almost no complications (Lakstein 2003).

The doctrine is Tactical Combat Casualty Care (TCCC), first published in 1996 (Butler 1996). The 75th Ranger Regiment, which trained every soldier in it, had killed-in-action and died-of-wounds rates of 10.7 and 1.7 per cent from 2001 to 2010, against 16.4 and 5.8 per cent across the Department of Defense (Kotwal 2011). Butler cites about 2,500 deaths from limb bleeding in Vietnam, roughly 9 to 10 per cent of combat deaths (Butler 1996, citing Maughon 1970 [VERIFY: Maughon not read]).

6.2 The civilian record and Stop the Bleed Stop the Bleed was launched by the American College of Surgeons Committee on Trauma after the Hartford Consensus, which followed the Sandy Hook school shooting of December 2012 [VERIFY: dates from secondary summaries]. At the Boston Marathon bombing of 15 April 2013, 66 of 152 hospital patients had limb injuries, including 17 traumatic amputations. All 27 tourniquets applied were improvised, and no patient died after reaching hospital (King 2015).

Elsewhere the civilian benefit is less clear. US ambulance data (Hashmi 2023) and a review of 55 civilian studies (Eilertsen 2021) associate tourniquets with better survival, on low-quality evidence. But a 2026 multicentre urban study found no benefit after matching: mortality 6.4 against 7.3 per cent (P = 1.0) (Taghavi 2026). Where a surgeon is minutes away, a missing tourniquet matters less. Training fades: of 46 trained nurses, 18 (39 per cent) could not apply a tourniquet correctly at 6 months (ClinicalTrials.gov NCT03762863 [VERIFY: publication not retrieved]).

6.3 The record where evacuation is long This matters most for the book. A 2025 scoping review of 52 reports with 27,429 patients found 48 per cent of data from the USA and 31 per cent from Iraq and Afghanistan, no primary author from a low-income country, a mean patient age of 31, 89 per cent men, and a mean tourniquet time of 146 minutes (median 72) (Johansson 2025). With tourniquet time over 4 hours, limb salvage fell to 57.1 per cent (Joarder 2023).

In the Sahel of Burkina Faso, 100 casualties with a mean prehospital time of 11.9 hours had 114 tourniquets. Only 5.3 per cent were both necessary and correctly placed. Of 24 amputations, 54.2 per cent were at a higher level because of the tourniquet and 50 per cent were linked to unnecessary tourniquets. Five patients died, three of tourniquet complications (Nacanabo 2026). In Ukraine, where drones slow evacuation, more than 60 per cent of patients arrived after more than 3 hours in 2025 against 15 per cent in 2016, and ineffective application rose from 17.4 to 37.5 per cent (Yatsun 2026). Infusion against muscle breakdown before release reduced kidney injury, amputation and death (odds ratios 0.33, 0.32 and 0.23) in a Ukrainian series of 120 (Lukiianchuk 2026). A village has no infusion, which is a reason to keep tourniquet times short.

6.4 Improvised tourniquets Cloth tied tight is not a tourniquet. On a manikin, a T-shirt tied without a windlass failed in 79 of 80 tests. With a stick twisted in as a windlass, failure fell to 32 per cent, still short of the authors' 80 per cent reliability threshold (Altamirano 2015). In a second manikin study the CAT succeeded in 100 per cent, an improvised bandage in 40 per cent and a bandana in 10 per cent (Lyles 2015). Windlasses break: 53.2 per cent of craft sticks, 26.1 per cent of pencils and 20.7 per cent of chopsticks (Kragh, Wallum and others 2015). A village should keep proper rods of hardwood or iron, about 15 to 20 cm long [VERIFY: dimension is my inference, not from a trial].

Width matters. The pressure needed to close an artery falls as the band gets wider relative to the limb, and once width exceeds half the circumference, occlusion happens below systolic pressure (Graham 1993). Narrow cords concentrate pressure on nerves, as Richard von Volkmann reported of narrow Esmarch bands in 1881. The often-quoted minimum of 3.8 cm (1.5 inches) could not be traced to a primary study [VERIFY].

In better conditions improvised devices work. In a perfused cadaver bleeding 700 mL a minute, a triangular bandage with a windlass and a leather belt both stopped the bleeding, the belt was fastest to secure (15.2 seconds) and the improvised windlass was rated easiest (Cremonini 2021). Swan found cloth with a windlass easiest of three devices in volunteers (Swan 2009). The 2020 systematic review of 20 studies found band and windlass the most consistent design but advised against improvised tourniquets for civilians, preferring direct pressure (Cornelissen 2020 [VERIFY: one results sentence appears to contradict the conclusion, full text not read]). The rule: a band at least a hand's width, a strong rod, and a way to lock it.

6.5 Time limits and conversion to pressure

- **TCCC.** Replace a tourniquet put on over clothing or more than 7.5 cm (3 inches) above the wound, or if surgery is more than 2 hours away. Do not convert in shock, when the patient cannot be watched closely, or after amputation. Consider not converting after 6 hours (CoTCCC, TCCC Module 9). A 2026 proposal would restrict conversion after 2 hours to medical personnel (CoTCCC Proposed Change 25-2).
- **Wilderness Medical Society.** Convert ideally by 2 hours, beyond which damage is progressive. A limb was saved after 16 hours in a 2007 case report. Insulate the limb but never heat it (WMS n.d.).

- **ICRC.** Tourniquets "save lives, but endanger limbs". The Red Cross first-aid manual proscribes field tourniquets except in very rare circumstances, and the war-surgery manual shows an above-knee amputation forced by a tourniquet left on more than 6 hours (Giannou and Baldan 2009, section 7.7.4).
- **Holcomb and colleagues** argued for rethinking prehospital conversion (Holcomb 2023, record only read).

TCCC and WMS independently agree on 2 hours as the target for conversion. TCCC and ICRC agree that beyond 6 hours the limb is in grave danger and release is itself dangerous. Between 2 and 6 hours the decision weighs limb against bleeding. **Method** (TCCC Module 9): pack the wound and press 3 minutes, apply a pressure bandage, loosen the tourniquet slowly over about 1 minute, leave it loose in place, and retighten if bleeding returns.

6.6 History in brief Hans von Gersdorff described binding limbs for amputation in 1517 and Wilhelm Fabry used a windlass around 1593. Étienne Morel is credited with a stick twisted in a bandage at the siege of Besançon in 1674 (some sources say 1678), though the Encyclopédie doubted it. Jean-Louis Petit presented a screw tourniquet to the Académie des Sciences in 1718, and Friedrich von Esmarch introduced the rubber bandage in 1873 (Science Museum n.d., Wikipedia n.d., Histoire des sciences médicales 2014 [VERIFY: dates from secondary sources]).

7. Internal bleeding

Bleeding into the chest, abdomen or pelvis is two thirds of potentially survivable battlefield deaths (Eastridge 2012), and no hand can reach it. The village can do four things. **Recognise it**: shock with no visible bleeding, a swollen or rigid belly, bruising of flank or belly, a broken thighbone (which can hold more than a litre), a pelvis that moves when pressed. **Splint and bind**: straighten and splint a broken femur, and bind an unstable pelvis with a sheet at the level of the hip bones. Unstable bleeding pelvic fractures carry mortality up to 40 per cent (CoTCCC, TCCC Module 9), and I found no trial of improvised binding. **Keep the patient still, warm and flat**, without forcing the pressure up (section 10). **Prepare honestly** for death (Red flags). Gynaecological bleeding has its own small evidence base for shepherd's purse (section 11).

8. Recognising shock

The traditional shock classes come from Advanced Trauma Life Support (ATLS). The ICRC version (Giannou and Baldan 2009, table 8.2):

Class	Blood lost (adult)	Pulse	Systolic pressure	Capillary refill	Breaths per minute	Mind
I	under 750 mL	normal	about 120	normal	14 to 20	lucid, thirsty, slightly anxious
II	750 to 1,500 mL (15 to 30%)	100 to 120	90 to 120, wrist pulse felt	delayed	20 to 30	anxious
III	1,500 to 2,000 mL (30 to 40%)	120 to 140, weak	below 90, wrist pulse not felt	delayed	over 30	confused, hostile
IV	over 2,000 mL (over 40%)	over 140, thready	below 60, neck pulse not felt	absent	over 35	lethargic

Pulse rules overestimate pressure. Of 12 hypotensive patients with wrist, groin and neck pulses all present, 10 had a measured systolic pressure below 80 (Deakin and Low 2000). Quin and McCarthy disputed the premise in reply.

Heart rate misleads. In about 165,000 UK trauma patients the median heart rate in class IV did not reach 140, and base deficit classified better (Mutschler 2013). **Capillary refill misleads early.** Pressing a nail bed for 5 seconds and timing the return of pink (normal about 2 seconds) seems simple, but in 42 volunteers under simulated blood loss the refill time paradoxically shortened in two thirds (Gustavsson 2025). Cold also slows it. The shock index (pulse divided by systolic pressure) above 0.9 is associated with death, but a 2026 review found its accuracy weak and inferior to a composite early warning score (Tolich 2026), and it needs a blood pressure cuff.

What a village can use is the trend. Record pulse rate, breathing rate and state of mind every 15 minutes. A climbing pulse, quickening breath, a fading wrist pulse and a patient turning confused or quarrelsome means bleeding faster than the body can cope. The loss of the wrist pulse is Kragh's line between 90 and 10 per cent survival (Kragh 2009).

9. Position and warmth

Lay the bleeding patient flat. The European Resuscitation Council allows raising the legs only when there is no sign of trauma, with a benefit lasting under 7 minutes (Djärv 2025, via a secondary summary [VERIFY: ERC primary text not retrieved]). A conscious patient bleeding from the face sits up and leans forward. An unconscious, breathing patient goes on the side.

The ICRC calls hypothermia, a core temperature below 35°C, the most potent factor in the "lethal triad" of cold, acidity and failed clotting (Giannou and Baldan 2009, section 8.8.1). TCCC teaching holds that mortality rises below 36°C (CoTCCC, TCCC Module 12), and a secondary source reports 100 per cent mortality below 32°C in trauma [VERIFY: Bennett 2020 not read]. It happens in any climate. Insulate from the ground first, remove wet clothing, wrap the whole body and head, and shelter from wind. Active external warming should not exceed 40 to 42°C at the source, and never on a tourniquetted limb or numb skin (Giannou and Baldan 2009, WMS n.d.).

10. Fluids without a drip: permissive hypotension

Bickell randomised 598 Houston patients with penetrating torso injury and systolic pressure of 90 or below. Survival was 70 per cent (203 of 289) when fluids were delayed until surgery and 62 per cent (193 of 309) when given at once ($P = 0.04$), with complications 23 against 30 per cent (Bickell 1994). Pushing pressure up dilutes clotting factors and "pops the clot".

The village has no drip, so it practises permissive hypotension by default. The ICRC target is a just-palpable wrist pulse, roughly a systolic pressure of 90, and the ICRC notes that when evacuation takes days, the patient needs fluid to survive the days and the clot argument fades (Giannou and Baldan 2009, section 7.7.5). It adds that oral rehydration solution is "probably not employed nearly enough" and probably does no harm even in abdominal trauma, if the patient is conscious and has no head injury. This is expert opinion, not a trial. Once bleeding is controlled, give a conscious, thirsty patient small, frequent sips (recipe in the oral rehydration report of this series). Hold off if vomiting, drowsy or head-injured, or if surgery on a belly wound is still possible. Once stable, aim for urine of 0.5 to 1 mL per kg per hour, about 35 to 70 mL an hour for 70 kg (Giannou and Baldan 2009). Dark, scanty urine after a long tourniquet warns of muscle breakdown.

11. Plants and preparations

Which haemostatics are worth carrying? Few, and none for a severed artery.

Yunnan Baiyao. A proprietary Chinese powder created by Qu Huanzhang in Yunnan in 1902 [VERIFY: from general sources]. The formula is a state secret. Its main ingredient is believed to be root of Panax notoginseng. After a recall in Hong Kong in 2013 the maker disclosed in 2014 that it contains processed root of Aconitum kusnezoffii, a source of aconitine (GoKunming 2014). *Record*: Ogle, Dai and Ma found in 1976 that it shortened bleeding time in rats and clotting time in rabbits and humans, not through its acidity or vasoconstriction, though calcium and particle size were not excluded (Ogle 1976). In a randomised trial of 87 jaw-surgery patients, 3 days of pre-treatment

cut blood loss from 420.3 ± 175.9 to 330.5 ± 134.4 mL, with no thromboembolism (Tang 2008). A meta-analysis of 13 Chinese trials in 1,379 patients with coughed blood found a relative risk of 1.18 for response and 107 mL less blood, but no fewer intubations (Wang Y 2022). Animal results conflict: no effect in a blinded horse trial, stronger clots in 18 dogs (Ness 2017, Tansey 2018). *Science*: a modest, mostly Chinese, unreplicated reduction in surgical blood loss (Qian 2025). Its notoginseng saponins also inhibit platelets (Wang W 2026). No trauma-wound trial exists. Adverse reactions occurred in 1.17 per cent of 31,556 hospital users (Li B 2019). **Verdict**: not reproducible after the Fall and not worth stockpiling for wounds.

Yarrow, Achillea millefolium (flowering herb). A daisy-family perennial, 30 to 90 cm, with feathery, finely divided leaves along a central rib, hairy stems and flat clusters of small white or pink flowers. *Dangerous lookalikes* are carrot-family plants with flat white heads: poison hemlock, Conium maculatum (smooth stems with purple blotches, mousy smell, up to about 3 m), and water hemlock, Cicuta maculata and C. douglasii (wet ground, hollow chambered stem base, cicutoxin, symptoms in 15 to 60 minutes and death within about 8 hours) (USDA ARS and university extension sources [VERIFY: exact URLs not retained]). Queen Anne's lace, Daucus carota, is harmless but confusing. *Tradition*: named for Achilles, used on wounds across Europe, Asia and North America. *Record*: no human trial. Rat liver incisions bled 32 to 36 per cent less briefly with a methanol extract (Bagheri 2024). In a 2026 test-tube study, yarrow had no effect on clotting times, while pomegranate flower (Punica granatum) shortened prothrombin time (11.57 against 14.47 seconds) and oak galls (Quercus infectoria) prolonged it (Mohamadi 2026). *Official*: the European Medicines Agency accepts traditional use on small superficial wounds as a dressing soaked in an infusion of 3 to 4 g dried herb in 250 mL boiling water, 2 to 3 times daily, not under 12, not in pregnancy or breastfeeding, and not with daisy-family allergy (EMA 2020). **Verdict**: a boiled infusion is a reasonable wash for small cuts. No evidence for serious bleeding.

Shepherd's purse, Capsella bursa-pastoris (flowering herb). A small cabbage-family annual with a rosette of lobed leaves, tiny white four-petalled flowers and flat, triangular or heart-shaped pods. *Lookalikes*: field pennycress, Thlaspi arvense, has hairless, wavy-edged leaves and rounder pods, and pepperweeds, Lepidium species, keep leaves up the flowering stem (Cornell CALS n.d., Wisconsin Horticulture Extension n.d.). None is known to be dangerous. *Record*: the European Medicines Agency accepts traditional use only for heavy menstrual bleeding with regular cycles once serious disease has been excluded, as 1 to 5 g dried herb in tea 2 to 4 times daily from 3 to 5 days before the period, not under 18 or in pregnancy, and judges clinical evidence insufficient (EMA 2011). In Iran, 10 sublingual drops of extract with oxytocin reduced postpartum bleeding more than oxytocin alone in 100 women (single-blind, $p < 0.001$) (Ghalandari 2017), and capsules with mefenamic acid reduced heavy menstrual bleeding in 84 women (triple-blind, $p < 0.001$) (Naafe 2018). Neither is replicated. **Verdict**: worth growing for heavy periods. Not a wound haemostat.

Cayenne, Capsicum annuum (fruit). Claimed to stop bleeding in seconds. Snopes traced the claim to a 2016 article citing a dead link, a cayenne seller and a 1970s herbal (Snopes n.d.). No study exists. Any dry powder helps a small clot form. Capsaicin adds pain and contamination. **Verdict**: do not use.

Tannin-rich barks and galls. Oak bark (Quercus robur), oak galls (Q. infectoria), pomegranate rind and flower (Punica granatum), witch hazel (Hamamelis virginiana), tormentil root (Potentilla erecta). Astringents used on every continent. Laboratory and animal studies show fibrinogen adsorption, red cell clumping and contact activation (PMC6600752, PMC11245493), but oak galls were anticoagulant in a test tube (Mohamadi 2026), so "tannin-rich" does not mean "clotting". No human wound trial. **Verdict**: a decoction is a plausible wash for oozing grazes and gums, never on large raw areas.

Cobweb. Bottom tells the fairy Cobweb in A Midsummer Night's Dream (Act 3, Scene 1) that "if I cut my finger, I shall make bold with you" (Shakespeare c.1595). On 14 June 1893 a New Zealand paper reported an inquest on a death from lockjaw after a head wound was dressed with cobweb, and the writer recalled two more deaths after cobwebs from a stable and a cowshed (Thames Star 1893 [VERIFY: title inferred from the Papers Past code]). Tetanus spores live in dust and dung. Silk may scaffold a clot, but the antibiotic claim fails: weak, short-lived inhibition of one bacterium (Wright and Goodacre 2012) and none in silk of 7 species (Fruergaard 2021, "The myth of antibiotic

spider silk"). **Verdict**: do not use.

Others. Ankaferd Blood Stopper, a Turkish extract of Thymus vulgaris, Glycyrrhiza glabra, Vitis vinifera, Alpinia officinarum and Urtica dioica, has mostly rat data and possible neurotoxicity (Simsek 2017, Tibi 2026). Siam weed, Chromolaena odorata (leaf), cut blood loss by up to 70.36 per cent in rabbit artery transection but showed no in vitro clotting effect (PMC3747403). Plantain, Plantago major, has menstrual trials only (Kianmehr 2026). I found nothing on Tridax procumbens.

Evidence grades

Grades: A, randomised trials or systematic reviews. B, consistent observational or clinical series. C, convergent traditional use across unrelated cultures with plausible pharmacology. D, a single tradition, anecdote or theory. X, shown ineffective or harmful.

Practice	Tradition says	Record shows	Science infers	Grade
Direct manual pressure	Stops bleeding	Universal, controls most external bleeding	Faster than dressings, very low certainty review	B
Pressure held at least 3 minutes	n/a	TCCC and Stop the Bleed teaching	Plausible from clot physiology, not trialled	D
Pressure points	Stops limb flow	Pulse returns in 20 to 40 s (lay volunteers)	Works briefly in trained hands with ultrasound	X for lay use, C as a trained bridge
Elevation	Slows bleeding	No supporting study	Dropped by ILCOR and ERC	D
Packing with gauze	n/a	Combat series and animal models	Mechanical tamponade, effective	B
Packing with clean cloth	Universal	ICRC practice, no trial	Same mechanism as gauze	C
Kaolin or chitosan dressing	n/a	Faster haemostasis in animals and reviews	Not better than plain gauze without pressure	B
Commercial tourniquet, short evacuation	n/a	90% survival before shock against 10% after	Large registries, replicated	B
Improvised band and windlass	Old surgical practice	Manikin 68% success, cadaver near 100%, Boston 27 improvised with no hospital deaths	Works if wide and with a windlass	C
Cloth tied without windlass	Common belief	Fails 99% on manikin	Does not occlude arteries	X
Tourniquet left on beyond 6 hours	n/a	High amputation, Sahel series	Ischaemia and reperfusion injury	X
Conversion at about 2 hours	n/a	Expert guidance, few data	Plausible, no trial	D
Permissive hypotension	n/a	One randomised trial, 598 patients	Short-transport torso trauma only	A (narrow)

Practice	Tradition says	Record shows	Science infers	Grade
Oral fluids once bleeding controlled	Universal	ICRC opinion	Plausible, untested in trauma	D
Warmth and insulation	Universal	Hypothermia predicts death	Cold impairs clotting	B
Shock by pulse and mind	n/a	ATLS classes, partly validated	Pulse rules overestimate pressure	B
Capillary refill as early sign	n/a	Paradoxical response in 2/3	Unreliable early	X
Yunnan Baiyao	Stops all bleeding	Small RCTs, surgical blood loss down about 20%	Mixed animal data, aconite present	B for surgery, D for wounds
Yarrow on small wounds	Wound herb across Eurasia and America	Rat data only	Neutral on clotting tests	C
Shepherd's purse internally	Womb and nose bleeding	Two small Iranian RCTs	Possible uterine action	B (narrow)
Shepherd's purse on wounds	Some European use	Nothing	Nothing	D
Cayenne	Stops bleeding at once	Nothing	Irritant	D, do not use
Tannin barks as a wash	Every continent	Lab and animal data	Mixed effects on clotting	C
Cobweb	Europe, Shakespeare	Tetanus deaths 1893	Not antibiotic	X
Chromolaena odorata	West Africa, Southeast Asia	Animal only	Uncertain	D

Means ledger

What each rung can do, and what it changes.

Practice	Hands and knowledge	Hearth	Garden and still	Village dispensary (300)	District infirmary (3,000)	Hospital before the Fall
Direct pressure	Palm or knee on wound, 3 to 10 min	Folded clean cloth under the hand	Boiled cloth stock, dried and wrapped	Sterile gauze from salvage, trained helpers	Same, plus suturing and ligation	Same, then surgery
Packing	Fingers only, poor	Strips of boiled cotton	Rolled sterile strips, alcohol for hands	Salvaged haemostatic gauze if any	Removal in a clean room, wound exploration	Surgical repair
Tourniquet	Hands cannot	Cloth band plus stick	Forged rods, sewn webbing bands 5 cm wide	Commercial tourniquets from salvage, time cards	Conversion by a trained person, fasciotomy if skilled	Pneumatic cuff, vascular repair

Practice	Hands and knowledge	Hearth	Garden and still	Village dispensary (300)	District infirmary (3,000)	Hospital before the Fall
Pressure bandage	n/a	Cloth bandage tied over pad	Elastic from salvage	Elastic bandages, Israeli-type if salvaged	Same	Same
Shock care	Lay flat, cover, watch	Blankets, hot stones in cloth, oral salt and sugar	Measured ORS by scale	Pulse watch, record sheet, thermometer	Blood pressure cuff, possibly IV salvage	Blood, plasma, surgery
Internal bleeding	Recognise, keep still	Sheet as pelvic binder, splint	Better splints	Same	A trained surgeon could open a belly, rarely	Surgery, interventional radiology
Plant preparations	Recognise yarrow	Infusion of yarrow, decoction of oak bark	Dried stock, tinctures in alcohol	Labelled stock, trained identification	Records of outcomes	Not used

What each rung changes. Hands and knowledge alone save the limb bleed if a tourniquet can be improvised, and the junctional bleed if pressed hard enough. The hearth adds clean cloth and fire, cutting infection. The garden and still add stock prepared in advance, so no one improvises under panic, and alcohol for clean hands. The village dispensary adds training, rehearsal and records, which the evidence suggests matter most: Kotwal's Rangers survived because every soldier was trained (Kotwal 2011), and skills fade within 6 months without practice. The district infirmary adds the possibility of tying off a bleeding vessel, a clean room for removing packs and a person who can convert tourniquets. The hospital adds blood, surgery for the torso bleed and vascular repair. The torso bleed is the one gap that no rung below the hospital closes.

Harm test

Direct pressure

- **How it harms.** Rarely. Pressing both sides of the neck can block airway or brain blood flow, and pressing an open skull fracture pushes bone inward. Press one side of the neck only, and around, not on, a soft skull. Watch for breathing difficulty or drowsiness and move the hand.

Packing

- **How it harms.** The pack in the wrong wound. In the chest it worsens air or blood collection, in the belly it drives gut contents and dirt deep, and in the skull it presses on the brain. Dirty cloth infects, and a forgotten strip rots into abscess or sepsis.
- **Never pack.** Chest wounds (cover with an airtight seal taped on three sides or held, see WO-02 [cross-reference]), wounds into the belly cavity (cover with damp clean cloth), and the skull.
- **Signs of harm.** Worsening breathlessness after a chest wound. Fever, spreading redness, smell or pus from day 2.
- **What to do.** Count every strip in and out. Write the count on the patient's skin or a card. Remove packing after 24 to 48 hours in a clean setting, soaking it first with boiled water [VERIFY: removal timing is my inference from ICRC practice, not a stated rule].

- **Note.** The ICRC removes packs from major vessel wounds only with a surgeon and blood ready (Giannou and Baldan 2009). After the Fall, removal is a judged risk.

Haemostatic powders and clay

- **How it harms.** Early QuikClot zeolite powder produced heat burns, which is why it was replaced by kaolin gauze [VERIFY: not read in a primary source]. Loose powders can embolise if poured into a large vessel. Earth clay carries tetanus.
- **Who must not.** Anyone with a wound into a body cavity.

Tourniquet

- **How it kills or maims.**
  - Left on too long: muscle death, nerve damage and higher amputation, and on release potassium and muscle protein flood the blood and can stop the heart or kidneys (Nacanabo 2026, Joarder 2023, Lukianchuk 2026).
  - Too loose: blood still arrives but cannot leave, so the limb swells and bleeds more. Ineffective in 22 per cent in Israel and 37.5 per cent in Ukraine in 2025 (Lakstein 2003, Yatsun 2026).
  - Too narrow or too long: nerve injury, the most common complication of prolonged use (Xacur-Trabulce 2025, Volkmann 1881). Not needed: the Sahel's 94.7 per cent (Nacanabo 2026).
- **Who must not receive one.** Anyone whose bleeding can be controlled with pressure and packing. Never over a joint, never on the neck, trunk or groin.
- **Signs it is going wrong.** Bleeding continues or the limb turns dark and swollen (too loose). After many hours, a cold, mottled, hard limb.
- **What to do.** Tighten until the bleeding stops and no pulse is felt beyond it. Write the time. Reassess every 15 minutes. Convert at about 2 hours if criteria are met. Beyond 6 hours do not release without someone able to manage what follows. If the limb is dead, it may be safer to leave the tourniquet and amputate above it than to release it.

Pressure points

- **How it harms.** Wasted time. The pulse returns within 20 to 40 seconds while the rescuer believes the bleeding is controlled (Swan 2009).

Permissive hypotension and oral fluids

- **How it harms.** Too little blood flow for too long damages the brain and kidneys. In head injury, low pressure worsens brain damage, so head-injured patients need the wrist pulse kept strong. Oral fluids in a drowsy patient can be inhaled.
- **Who must not.** No oral fluids if drowsy, vomiting or with a head injury.

Warmth

- **How it harms.** Burns from hot stones or bottles on numb or tourniquetted skin. Direct heat on a tourniquetted limb speeds tissue damage (WMS n.d.).

Yunnan Baiyao

- **How it harms.** Contains aconite. Aconite poisoning causes numbness, vomiting, heart rhythm disturbance and death. In pregnancy, rat embryo toxicity appeared above 0.5 g/kg (Yao Q 2021). Not for pregnancy. Counterfeit or homemade versions would carry unknown aconite.

Yarrow

- **How it harms.** Misidentification: hemlock or water hemlock on a wound or in tea can kill. Allergy in the daisy-family sensitive (ragweed, chamomile). A raw crushed leaf brings soil into the wound.
- **Who must not.** Under 12, pregnancy and breastfeeding, daisy-family allergy (EMA 2020).
- **Signs.** Rash, blistering, spreading redness.

Shepherd's purse

- **How it harms.** Masks serious disease if used for abnormal bleeding without asking why. Not for pregnancy (EMA 2011).

Cayenne

- **How it harms.** Severe pain, inflammation, contamination from ground spice. Nothing to gain.

Tannin barks

- **How it harms.** Absorption through large wounds can damage the liver (the tannic acid burn treatments of the 1930s and 1940s [VERIFY: historical detail not read in a primary source]). Bark scraped from the ground carries soil.

Cobweb

- **How it harms.** Tetanus. Three deaths are recorded in a single 1893 New Zealand report, from cobwebs taken from a stable and a cowshed (Thames Star 1893). Tetanus kills about half of those who develop it without intensive care [VERIFY: case fatality to be taken from the tetanus report in this series].

Red flags

These signs mean the patient will probably die or lose a limb without what the village cannot give.

1. **Shock without visible bleeding.** A rising pulse, fast breathing, pale cold skin and confusion with no wound you can press: bleeding inside the chest, belly or pelvis.
2. **Wrist pulse gone.** In Kragh's data, a tourniquet applied after the wrist pulse disappeared gave 10 per cent survival (Kragh 2009).
3. **A wound in the trunk, neck or groin that keeps bleeding through firm packing.**
4. **A rigid, swelling belly, or a pelvis that moves.**
5. **A limb tourniquet on for more than 6 hours**, a limb that is cold, mottled and hard.
6. **Dark brown urine or no urine** after a long tourniquet or crush.
7. **A head injury with falling consciousness and bleeding.**
8. **Spreading black or bronze skin with crackling under the fingers after a wound has been packed**, which is gas gangrene.

What to do anyway. Keep pressure on everything you can reach. Keep the patient flat, warm, still and dry. Give sips of oral rehydration solution if conscious and not vomiting. Keep records. Send for anyone with surgical skill. Do not abandon the patient to search for a cure that does not exist.

Honest comfort. When the bleeding is inside and the patient is failing, say so, gently, to the patient if conscious and to those who love them. Let them be with the people they want. Thirst can be eased with wet cloth on the lips. Warmth and a held hand matter. People in severe shock often become calm before they die. The healer's task is to stay, to keep them warm and to make sure they are not alone. Write down what happened, so the next healer learns from it.

The case against

Against the tourniquet. The ICRC war surgeons Christos Giannou and Marco Baldan state that field tourniquets "save lives, but endanger limbs", that improvised versions are usually ineffective and damaging, and that the Red Cross first-aid manual proscribes them except in very rare circumstances (Giannou and Baldan 2009). Their experience comes from wars where evacuation takes days, which is exactly the setting after the Fall. Nacanabo and colleagues in Burkina Faso showed what happens when tourniquets are taught without judgement and evacuation is slow: 5.3 per cent correct, half of the amputations linked to unneeded tourniquets (Nacanabo 2026). Johansson, Wild and colleagues showed that the evidence base is almost entirely from rich countries and young men (Johansson 2025). Taghavi and colleagues found no survival benefit in an urban civilian setting (Taghavi 2026). Cornelissen and colleagues recommended against improvised tourniquets for civilians (Cornelissen 2020).

The reply. Kragh's figures are hard to argue with when bleeding is arterial and life-threatening. Five patients who needed a tourniquet and did not get one all died (Kragh 2009). The two positions agree more than they disagree. Both put direct pressure and packing first. Both reserve the tourniquet for bleeding that cannot otherwise be stopped. The difference is in emphasis and in what follows: TCCC assumes a surgeon within hours, the ICRC does not. The book should teach the tourniquet as TCCC does, and the conversion and restraint as the ICRC does.

Against haemostatic dressings. Watters and colleagues found plain gauze as good as Combat Gauze and Celox when packed without pressure (Watters 2011). The value of these products is real but small, and plain cloth is a fair substitute.

Against the shock table. Deakin and Low, Mutschler and Gustavsson, each with colleagues, undermine the pulse, heart-rate and capillary-refill rules (section 8). The table is useful for trend, not for a single reading.

Against the herbal. Plant haemostatics rest on rats, test tubes and tradition. Yarrow did nothing to clotting times (Mohamadi 2026), the antibiotic cobweb is a myth (Fruergaard 2021), the cayenne claim traces to nothing (Snopes n.d.), and Yunnan Baiyao, with the best trials, contains aconite and cannot be made. Pressure and cloth stop bleeding. Plants at best help small oozing wounds.

Against the hospital romance. The record also says that hospital medicine cannot stop the main killer, truncal bleeding, before the patient reaches a surgeon (Eastridge 2012). Most of what saves life in the first ten minutes needs no hospital at all.

Feasible today against feasible after the Fall. Today: commercial tourniquets, haemostatic gauze, rapid evacuation, blood transfusion. After the Fall: hands, cloth, sticks, training, records, warmth and oral fluids. The salvaged stock of commercial tourniquets will run out or perish (elastic and plastics age). The village must learn to make and maintain its own.

10-line summary

1. Direct pressure controls most external bleeding. Hold it hard for at least 3 minutes, ideally 10, without lifting to look.
2. Deep and junctional wounds need packing: fill the cavity with cloth, then press hard.
3. Plain clean cloth or gauze, packed well, did as well as kaolin or chitosan gauze in a pig model.
4. Tourniquets applied before shock gave about 90 per cent survival in Iraq, against 10 per cent after shock.
5. An improvised tourniquet needs a wide band and a strong windlass. Cloth tied without a windlass fails 99 per cent of the time.
6. A tourniquet should be converted to pressure by about 2 hours if possible. Beyond 6 hours, release is dangerous and limbs are often lost.
7. Pressure points and elevation are unreliable in lay hands.

8. Shock is best judged by trend: rising pulse and breathing, fading wrist pulse, changing mind. Capillary refill misleads early.
9. Keep the bleeding patient flat, warm and insulated from the ground. Without a drip, permissive hypotension is automatic, and oral fluids help once bleeding is controlled in a conscious patient.
10. No plant stops arterial bleeding. Yarrow infusion is a reasonable wash for small wounds, shepherd's purse may help heavy periods, cobweb and cayenne should not be used.

Open questions

- **How long should a tourniquet stay on when there is no surgeon at all?** No study addresses evacuation that never comes.
- **Is 3 minutes of pressure enough, or is 10 better?** No trial compares them.
- **Does packing with boiled cotton cloth match gauze in humans?** Inferred, not tested.
- **When should a pack be removed when no surgeon is coming?** Unknown.
- **Can a trained lay person reliably use a pressure point as a bridge?** Pikman Gavriely and Swan disagree, and the populations differ.
- **Is there any garden plant that measurably speeds clotting in a human wound?** None shown. Pomegranate flower is the best test-tube candidate (Mohamadi 2026).
- **What is the safe volume and composition of oral fluid in a bleeding trauma patient?** ICRC opinion only.
- **What is the minimum width for an improvised tourniquet?** The 3.8 cm figure could not be traced.
- **How should a village train and retest?** Skills fade within 6 months, and no post-collapse model exists.

Sources to read in full

1. Giannou and Baldan 2009, ICRC War Surgery volume 1, chapters 5, 7 and 8. The best guide for long evacuation.
2. Kragh 2009, Annals of Surgery. The survival figures.
3. Kragh 2008, Journal of Trauma. Device performance, time and morbidity.
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6. Charlton 2021, Prehospital Emergency Care. The ILCOR review of all methods.
7. Bickell 1994, New England Journal of Medicine. The fluid trial.
8. CoTCCC 2024 guidelines and TCCC Module 9. Current packing and conversion rules.
9. Watters 2011, Journal of Trauma. Gauze against haemostatic dressings.
10. EMA monographs on yarrow (2020) and shepherd's purse (2011). The official limits of herbal use.

At the bedside after the Fall

The household

Minimum viable version. Every adult can press hard on a wound for 10 minutes, pack a deep wound with cloth, and make a tourniquet from a band of cloth and a stick. Every household keeps a bleeding kit.

What it needs to start. - Materials: 2 rolls of boiled, dried cotton strips (each about 10 cm wide and 3 to 4 m long), wrapped in a clean cloth and kept dry. Two folded cloth pads. One tourniquet band (cloth or webbing, at least 5 cm wide, 1 to 1.5 m long). One windlass rod of hardwood or iron, 15 to 20 cm long. A pencil or charcoal stick for writing the time. A wool blanket. - Skills: direct pressure, packing, tourniquet, shock watch, recovery position. - Records: write the time on the patient's forehead or the tourniquet.

First failure to expect. The tourniquet that is too loose. The rescuer stops when it hurts the patient, and the limb bleeds more. Teach that a correct tourniquet hurts a great deal.

The village of 300

Minimum viable version. A trained bleeding-control team of at least 6 people, so two are always present. Practice every 3 months. One central kit and one per household. A record book of every serious bleed and its outcome.

What it needs to start. - Materials: 20 or more tourniquets (salvaged commercial ones plus locally sewn bands with forged windlasses), 50 rolls of boiled packing strips, elastic bandages if salvaged, blankets, a stretcher, a sheet for pelvic binding, a watch or sand-glass, salt and sugar for oral rehydration solution. - Plants: a bed of yarrow (correctly identified and labelled), a patch of shepherd's purse, an oak or other tannin source. - Skills: conversion of tourniquets, recognising internal bleeding, honest comfort. - Records: a bleeding register (date, name, wound, method, time of tourniquet on and off, outcome at 1 day, 7 days and 30 days).

First failure to expect. Skills fade. Within 6 months, a third of trained people cannot apply a tourniquet. Hold drills.

The district of 3,000

Minimum viable version. An infirmary with a clean room, a person who can tie off a vessel and convert tourniquets, salvaged haemostatic gauze kept for the worst wounds, and stretcher teams and a cart that can bring a casualty in within 2 hours.

What it needs to start. - Materials: suture and ligature material (silk or boiled linen thread), artery forceps, a scalpel, sterile instruments (pressure cooker), lamps, blood pressure cuff if salvaged, a stock of oral rehydration solution. - Skills: wound exploration, ligation, debridement, fasciotomy for the very skilled, recognition of muscle breakdown after long tourniquets. - Records: the district bleeding register, combining all villages, reviewed every 6 months.

First failure to expect. The 2-hour evacuation will not happen. The tourniquet put on in a far village will arrive after 6 hours. Teach conversion at village level.

Protocols

Protocol 1: Massive bleeding from an arm or leg

- ☐ Make yourself safe. Shout for help.
- ☐ Expose the wound. Cut away clothing.
- ☐ Press hard with the palm or knee directly on the bleeding point, through a pad of clean cloth if you have one.
- ☐ If blood is spurting or pooling fast, or soaking through within 1 minute, go to Protocol 2 (tourniquet) at once. Do not wait for shock.
- ☐ If bleeding slows with pressure: keep pressing hard for at least 3 minutes, aim for 10. Do not lift to look.
- ☐ If the wound is deep, pack it (Protocol 3).
- ☐ Bind with a pressure bandage: pad over the wound, cloth wrapped tightly round the limb, knot over the pad. Check fingers or toes beyond for colour after 5 minutes. If they turn blue and cold, loosen slightly.
- ☐ Lay the patient flat, insulate from the ground, cover (Protocol 5).

Protocol 2: Improvised tourniquet

- ☐ Band: cloth or webbing at least 5 cm wide (two fingers is too narrow, a hand's width is better), long enough to go round the limb twice and tie.
- ☐ Place it 5 to 7.5 cm (2 to 3 inches) above the wound on bare skin. Never over the knee or elbow. If the wound is just below a joint, place the band above the joint.

- ☐ Tie a half-knot. Lay a strong rod (hardwood or iron, 15 to 20 cm) on the knot. Tie a full knot over the rod.
- ☐ Twist the rod until the bleeding stops and no pulse can be felt at the wrist or foot beyond. This will hurt the patient badly. Keep going.
- ☐ Lock the rod: tie its ends to the limb with a second strip so it cannot unwind.
- ☐ Write the time on the patient's forehead and on the band. Example: "TQ 14:20".
- ☐ If bleeding continues, apply a second tourniquet directly above the first, side by side, and tighten.
- ☐ Recheck every 15 minutes: bleeding, pulse beyond, tightness. Pressure falls as the muscle relaxes.
- ☐ Do not cover the tourniquet. Insulate the limb but never heat it.

Protocol 3: Packing a deep or junctional wound (groin, armpit, side of neck)

- ☐ Wash your hands with soap or alcohol if it does not cost time.
- ☐ Find the bleeding point at the bottom of the wound with a finger.
- ☐ Push the end of a cloth strip onto the bleeding point with one or two fingers. Keep pressure on it.
- ☐ Feed in more strip, layer on layer, pushing down hard, until the wound is completely filled and the cloth stands 2.5 to 5 cm above the skin.
- ☐ Press with both hands, straight arms, body weight, for at least 3 minutes, aim for 10.
- ☐ If blood soaks through, do not pull out the pack. Add more and press another 3 minutes.
- ☐ Bind firmly with a pressure bandage.
- ☐ Count the strips used. Write the number on a card attached to the patient.
- ☐ Never pack: chest wounds, wounds into the belly, wounds of the skull.
- ☐ For the neck: press on one side only. Watch breathing.

Protocol 4: Tourniquet check and conversion (by a trained person)

- ☐ Only if all are true: the patient is not in shock (wrist pulse strong, mind clear), you can watch them for the next 2 hours, the limb is not amputated, and the tourniquet has been on less than 6 hours.
- ☐ Target: within 2 hours of application.
- ☐ Pack the wound and press 3 minutes. Apply a tight pressure bandage over the pack.
- ☐ Loosen the tourniquet slowly over 1 minute. Leave it in place, loose.
- ☐ Watch the wound for 10 minutes. If bleeding returns, retighten the tourniquet and write the new time.
- ☐ If the limb has been tourniquetted more than 6 hours: do not release in the field unless a skilled person and oral fluids are ready. Expect dark urine, weakness and heart rhythm problems after release.
- ☐ Record everything.

Protocol 5: Shock care without a drip

- ☐ Stop all visible bleeding first.
- ☐ Lay flat. Legs up only if there is no injury and the patient fainted. Face or mouth bleeding in a conscious patient: sit up, lean forward.
- ☐ Insulate from the ground (blanket, straw, coats). Remove wet clothes. Cover head and body. Shelter from wind.
- ☐ Warm with hot water bottles or warmed stones wrapped in cloth, not hotter than hand-hot (about 40 to 42°C), never on a tourniquetted limb or numb skin.
- ☐ Every 15 minutes record: time, pulse rate, wrist pulse present or not, breaths per minute, mind (alert, confused, drowsy).
- ☐ Once bleeding is controlled, if conscious, not vomiting, no head injury: give oral rehydration solution in sips, about 100 to 200 mL every 15 to 30 minutes, as tolerated [VERIFY: volumes are my practical suggestion, not from a source].
- ☐ Do not try to raise a weak pulse to normal. A wrist pulse you can just feel is the target.

- ☐ If the patient has a head injury, aim to keep the wrist pulse strong.
- ☐ If the pulse climbs, breathing quickens, the wrist pulse fades and the mind clouds with no visible bleeding, suspect internal bleeding. See Red flags.

Protocol 6: Yarrow wash for small wounds

- ☐ Confirm identity: feathery, finely divided leaves, hairy stem, aromatic. No purple blotches, no hollow chambered base, no mousy smell.
- ☐ Dry herb 3 to 4 g (about 1 tablespoon) in 250 mL boiling water. Cover, steep 10 minutes, strain through boiled cloth, cool.
- ☐ Soak a clean cloth and apply to the small wound. Change 2 to 3 times a day.
- ☐ Not for children under 12, in pregnancy or breastfeeding, or with daisy-family allergy.
- ☐ Stop if a rash appears or the wound becomes red, hot and swollen.
- ☐ Make it fresh each day.

Numbers to carry

1. **3 minutes, aim for 10.** Hard pressure on a packed wound, without lifting.
2. **90 against 10.** Survival with a tourniquet applied before shock against after (Kragh 2009).
3. **5 to 7.5 cm above, never over a joint.** Tourniquet placement.
4. **2 hours and 6 hours.** Convert by 2 hours if possible. Beyond 6 hours, release is dangerous and the limb is often lost.
5. **Every 15 minutes.** Recheck a tourniquet and record pulse, breathing and mind.
6. **No windlass, no tourniquet.** Cloth tied without a stick failed 99 per cent on a manikin.
7. **5 litres.** An adult's blood. Losing 1.5 litres brings shock, losing 2 litres can kill.
8. **Pulse over 120, breaths over 30, confused.** Class III shock, 30 to 40 per cent of blood lost.
9. **35°C.** Below this core temperature, blood stops clotting well.
10. **Two thirds.** The share of preventable bleeding deaths that are in the trunk, where no village hand can reach.

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