WO-11 Local and regional anaesthesia and the old analgesics: coca, nerve blocks, opium, cold, hypnosis

HEALING after the FALL, research library, WO-11

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

How to read this

Most village procedures need the pain taken out of one part of the body for half an hour, not sleep. This report reviews the ways of doing that without general anaesthesia. Where the material allows, each section separates the tradition, the record and what modern science infers.

The working sources were read in full for the chapters cited: the two ICRC war surgery manuals (Giannou and Baldan 2009, Giannou, Baldan and Molde 2013), the ICRC *Anaesthesia Handbook* (ICRC 2017), Esdaile's *Mesmerism in India* (Esdaile 1846) and the UK lidocaine licence (Mercury Pharma 2023). Most trials and reviews were read as abstracts, as the references say. King's *Primary Anaesthesia* and Dobson's *Anaesthesia at the District Hospital* could not be opened.

The rule on dangerous substances binds this report. Opium, coca and local anaesthetics appear here as history, evidence, dose, signs of overdose and honest feasibility. There is no word on how to extract, make or purify any of them.

The library. Fracture care (THRIVING library, WO-05) set out a haematoma block and flagged a dosing conflict. Section 1.2 resolves it. The other related reports named in the brief (WO-10, ME-05, ME-06, CH-07, WO-16, NU-08) did not exist in the library when this was written, so this report could not build on them. Cross-references to them are placeholders.

1. Findings by section

1.1 From Koller's cocaine to lidocaine

The record. - **1860.** Albert Niemann isolated cocaine from the coca leaf (Redman 2011). - **1884, Koller.** Carl Koller, a junior Viennese eye surgeon, showed that cocaine drops made the cornea insensible. A colleague, Brettauer, read his paper at the Heidelberg Ophthalmological Society on 15 September 1884, because Koller could not afford the journey (LITFL n.d., Association of Anaesthetists n.d.). Koller presented in Vienna on 25 October (Redman 2011). Squibb is said to have received 300 orders for cocaine in six weeks (LITFL n.d., secondary). - **1884, Halsted.** In New York, William Halsted made the first mandibular nerve block. He and his students experimented on themselves, and Halsted became addicted (Redman 2011). - **1885 and 1898, spinals.** James Leonard Corning made the first spinal injection in 1885. August Bier made it a method in 1898 (Redman 2011). - **1904 to 1905, procaine.** Alfred Einhorn made procaine, and Heinrich Braun introduced it (Redman 2011). - **1943, lidocaine.** Nils Löfgren made lidocaine in Stockholm. It was marketed as Xylocaine [VERIFY, secondary].

The toll. In 1924 a committee of the American Medical Association reported on deaths from local anaesthetics [VERIFY, secondary, no death count found]. US FDA adverse-event reports from 1968 to 2023 hold 1,473 deaths among 22,050 local anaesthetic events (Fettiplace 2025, abstract). Lidocaine was the drug most often named. Since 2010 the main contributors were high-dose lidocaine, nerve catheters and high spinal or epidural blocks. These are reports, not rates, but the commonest local anaesthetic still kills when the dose is wrong.

What modern science infers. Local anaesthetics block sodium channels in nerve. Any of them that reaches the blood acts on the brain and heart (section 4.1). Safety rests on two habits: keep the total dose under the ceiling, and never inject into a vein.

1.2 Lidocaine: the maximum dose, and the WO-05 conflict resolved

The conflict. The fracture report recommends a haematoma block of "10 ml of 2% lidocaine without adrenaline (King 2018)". It notes that the ICRC ceiling of 3 mg/kg makes this "at or above the limit for a small adult" (THRIVING library, WO-05).

The arithmetic. 1% lidocaine is 10 mg per ml. 2% is 20 mg per ml. So 10 ml of 2% is 200 mg.

Source	Plain lidocaine	With adrenaline
ICRC war surgery manual, Table 17.1 (Giannou and Baldan 2009)	3 mg/kg, a "rule of thumb" equated to "200 mg for an adult"	6 mg/kg
ICRC volume 2, intercostal annex (Giannou, Baldan and Molde 2013)	3 mg/kg	6 mg/kg
UK product licence (Mercury Pharma 2023)	200 mg maximum for a healthy adult	not in the part read
US label, as summarised by StatPearls (search summary only)	4.5 mg/kg, cap 300 mg	7 mg/kg, cap 500 mg
WikiMSK (WikiMSK n.d.)	4 to 4.5 mg/kg, cap 300 mg, 80% of that under age 8, half in the elderly with liver or kidney disease	as US
American Family Physician, via WO-03 (THRIVING library, WO-03)	3 to 5 mg/kg	7 mg/kg

The evidence behind the ceilings. - **Rosenberg's review.** Rosenberg, Veering and Urmey (2004, abstract) found the maximum doses unchanged for 50 years and not based on evidence. Blood levels depend on the site: intercostal injection gives the highest, subcutaneous lower. They advise lower doses in late pregnancy, the old and kidney failure. - **Where the ICRC figure sits.** The ICRC's 3 mg/kg appears in its intercostal annex, where absorption is fastest (Giannou, Baldan and Molde 2013).

In a haematoma block. - **Blood levels.** Eight patients given 2.2 to 2.4 mg/kg into a radius fracture peaked at 20 to 30 minutes at 100 to 1,100 ng/ml, against a toxic threshold of 5,000 (Meinig 1989, abstract). - **A warning case.** A 72-year-old woman of 81.65 kg given 20 ml of 1% (about 2.4 mg/kg) had slurred speech and visual flashes about a minute later, gone within an hour. The authors suspect fast absorption through cancellous bone (Burch and Stevens 2023). - **Strength against volume.** A trial of 20 patients compared 10 ml of 2% with 20 ml of 1%, both 200 mg. Pain scores were 5.50 against 3.09 out of 10, not significant (Orbach 2018, search summary only). - **Usual practice.** WikEM gives 5 to 10 ml of plain 2% and a wait of 5 to 10 minutes (WikEM n.d.).

Resolution. King and the ICRC agree at about 67 kg and above, where both give 200 mg. They part only for lighter patients. The village has no lipid emulsion, no oxygen and no one who can manage a stopped heart, so it should

take the lower figure every time. The rule for the book [VERIFY, my arithmetic from the sources above]: - **Plain lidocaine:** the lesser of 3 mg/kg and 200 mg. - **In 2% solution:** 0.15 ml per kg. That is 7.5 ml for 50 kg, and 10 ml for 67 kg or more. - **In 1% solution:** 0.3 ml per kg, never over 20 ml. Prefer 1%. The volume spreads through the haematoma (Orbach 2018), and a one-millilitre slip costs 10 mg, not 20. - **Less for:** the frail, the old, liver or kidney disease, and late pregnancy (Rosenberg 2004, WikiMSK n.d.). - **Every time:** aspirate, inject slowly, wait 10 to 15 minutes.

This agrees with WO-05's working figure of about 7 ml for 50 kg. It differs from WO-05 in one respect. King's 10 ml of 2% is the ceiling for a 67 kg adult, not a standard dose.

1.3 How long salvaged lidocaine keeps

- **The label.** Four years below 25 °C (Mercury Pharma 2023).
- **The US military's extension programme.** It tested 3,005 lots of 122 products. 88% were extended at least a year past expiry, by an average of 66 months (Lyon 2006, abstract). Lidocaine with adrenaline is reported among the products that often failed [VERIFY, secondary].
- **Forty-year-old ampoules.** Zilker's thesis found procaine at about 70% of its labelled content, lost by hydrolysis, and adrenaline at about 70%, lost by oxidation (Zilker 2019). Lidocaine was not tested.
- **Buffered lidocaine** stayed stable for 28 days at 5 °C (Pascuet 2009, search summary only).

What science infers. Lidocaine is an amide. It resists hydrolysis far better than an ester such as procaine, so it should outlast procaine. Plain lidocaine should outlast lidocaine with adrenaline [VERIFY, my inferences from Zilker 2019 and Lyon 2006]. No study found measured lidocaine decades past expiry.

The village rule. - Use plain lidocaine past its date if it is clear, colourless, free of particles and was kept cool and dark. - Discard anything cloudy or discoloured. - A pierced multi-dose vial is an infection risk whatever its date [VERIFY, standard teaching].

The district shelf in the first-aid report lists 50 vials of 1% lidocaine with shelf life to be checked (THRIVING library, FO-11). This section is that check, as far as the evidence goes.

1.4 The blocks a trained lay healer can learn

Every success rate below comes from trained hands. No study found measured lay healers giving blocks. A 2023 systematic review of anaesthetic task-shifting found only four or five anaesthesia studies, with conflicting results (Health Policy Plan 2023, search summary only). The nearest parallel is a Kenyan programme in which non-anaesthetists trained for five days gave ketamine for more than 1,200 operations without a reported ketamine death. About 13% had hallucinations (Cleveland Clinic 2016, programme report).

Digital block (finger or toe). - **Dose.** The ICRC uses 2% plain lidocaine, 2 to 4 ml per digit (Giannou and Baldan 2009). - **Adrenaline.** The ICRC warns of "danger of ischaemic gangrene" with adrenaline in fingers, toes, ears or penis (Giannou and Baldan 2009). The Dalhousie Project disagrees: 3,110 hand and finger cases with adrenaline 1:100,000 or weaker had no digital tissue loss (Lalonde 2005, abstract). The village lacks the reversal drug, phentolamine, so it uses plain lidocaine. - **Success.** A single volar injection works in about 89% of fingers, dorsal techniques in 60 to 92% (NYSORA n.d., secondary). - **Teachability.** It is the easiest block to teach [VERIFY, my judgement].

Haematoma block (broken wrist). The dose is as in section 1.2. In a randomised trial of 142 patients, the intravenous regional (Bier) block was better (Kendall 1997, abstract):

Measure	Bier block (n=72)	Haematoma block (n=70)
Pain while giving the block, out of 10	2.8	5.3
Pain during manipulation, out of 10	1.5	3.0

Measure	Bier block (n=72)	Haematoma block (n=70)
Needed remanipulation	4	17

Neither arm had complications. A Cochrane review of 18 trials and about 1,200 patients found the Bier block better in five trials, and the haematoma block quicker and easier. The evidence was not enough for firm conclusions (Handoll 2002, abstract). The Bier block needs a reliable cuff and a vein line, and deaths have followed cuff failure (Heath 1982, title only). The ICRC uses 40 ml of 0.5% lidocaine for it (Giannou and Baldan 2009). It belongs to the district, the haematoma block to the village.

Field block and infiltration (wounds, abscesses, lumps). - **Doses.** The ICRC gives 1% with adrenaline up to 40 ml, diluted with saline for more volume, and 1% plain up to 20 ml (Giannou and Baldan 2009). - **The commonest mistake** is to cut immediately after injecting (Giannou and Baldan 2009). - **Abscesses** numb poorly because inflamed tissue is acidic. Ring the abscess rather than inject into it [VERIFY, standard teaching].

Dental blocks. - **Upper teeth** numb well by infiltration, because the bone is thin. Lower back teeth need the inferior alveolar nerve block [VERIFY, standard teaching]. - **Inflamed teeth.** That block often fails when the pulp is inflamed. Secondary sources give failure rates from 25% to over 80% [VERIFY, trials not read]. Adding an infiltration improves success (Yadav 2015, abstract). - **Teachability.** Upper infiltration is within a trained lay healer's reach. The lower block needs a teacher who has done it [VERIFY, my judgement].

Intercostal block (rib fractures). Blood levels rise fastest here (Giannou, Baldan and Molde 2013), and the lung lies just beneath [VERIFY]. It is a district skill.

Spinal anaesthesia (district only). - **ICRC practice for caesarean** (ICRC 2017): - a 25-gauge pencil-point needle and 1.5 to 2.3 ml of heavy bupivacaine 0.5% - blood pressure checked every two minutes, and falls treated aggressively, with nausea as an early warning - the block height tested with ice - low volumes on purpose, because a high spinal is hard to manage in the field - motor function returns within about six hours - **The French survey** of 103,730 regional anaesthetics (Auroy 1997, abstract): - 32 cardiac arrests, 26 of them in spinals - cardiac arrest in 6.4 per 10,000 spinals against 1.0 per 10,000 for other techniques - nerve injury in 6 per 10,000 spinals against 1.6 - 21 of 34 nerve injuries followed pain or tingling on needling or injection - 23 seizures from toxicity, none with cardiac arrest - **Headache afterwards.** It affected 6.6% of patients with cutting needles and 2.6% with pencil-point needles, in 25 trials and 6,539 patients (Xu 2017). - **Who can do it.** A spinal needs fluids, a drug to raise blood pressure, and someone who can ventilate. That means a trained nurse or doctor at the district.

1.5 The coca leaf as a topical

The plant. The coca plants are *Erythroxylum coca* Lam. and *E. novogranatense* (D. Morris) Hieron., and the leaf is used. They are tropical montane plants, and the Amazonian variety *ipadu* is weaker (Plowman and Rivier 1983, abstract). No dangerous lookalike was found. Outside the tropics there is no coca [VERIFY, my inference].

The tradition. Andean chewers hold leaf with lime or ash in the cheek, and the mouth goes numb (Medeiros and Rahde 1989).

The record. - **Cocaine content** of dried leaf is about 0.25 to 0.77% (Plowman and Rivier 1983, via secondary summaries) or 0.5 to 1% (Medeiros and Rahde 1989). - **Blood levels.** In a 1979 study by Holmstedt and colleagues, 5 to 10 g of leaf gave peak plasma levels of 10 to 150 ng/ml and a numb mouth for about an hour [VERIFY, secondary summary only]. - **Overdose.** The oral lethal dose of cocaine in adults is about 1,200 mg, which INCHEM says chewing does not reach. Poisoning brings excitement, seizures, a fast and irregular heart, wide pupils and fever, and is treated with diazepam and support (Medeiros and Rahde 1989).

Modern science. Pharmaceutical cocaine solution (4 to 10%) still numbs the nose for surgery. The label maximum is 3 mg/kg or 160 mg. The review advises 1.5 mg/kg. The effect lasts 30 to 60 minutes, and the risk of heart attack is up to 24 times higher in the following hour (Lutfallah 2023).

For the village. A chewed leaf numbs a mouth sore, gum or throat for an hour. It does not numb skin or a wound and is not a surgical anaesthetic. Concentrating the alkaloid is outside this book's rules and the village's means.

1.6 Opium and morphine before and after a procedure

The plant. The opium poppy, *Papaver somniferum* L., gives latex from the unripe capsule. Its lookalike is the common poppy, *P. rhoeas* L., which has negligible morphine [VERIFY, no source read].

The tradition and the record. Opium was the analgesic of pre-modern surgery and of the nineteenth-century nursery. Three-quarters of British opium deaths in the 1850s were in children under five (THRIVING library, FO-05).

The unknowable dose. - **Crude opium** is roughly 10 to 12% morphine, and varieties range from about 9 to 21% [VERIFY, secondary]. - **Liquids.** Opium tincture is standardised at 10 mg of morphine per ml, paregoric at 0.4 mg per ml, a 25-fold difference (Pharmacy Times 2003). One death followed about a teaspoon of tincture, about 50 mg of morphine. - **Poppy seed tea.** Morphine in seed ranged from under 1 to 2,788 mg per kg, median 97.3, and washing removed about 73% (Powers 2018, abstract). Stephen Hacala died aged 24 in April 2016 after poppy seed tea. CSPI counts 19 US deaths (CSPI 2021).

Modern doses, from two sources.

Use	ICRC (ICRC 2017)	Second source
Adult, by mouth	10 to 20 mg every 2 to 4 hours	Start 5 to 10 mg every 4 hours (GPnotebook n.d.)
Adult, under the skin or into muscle	5 to 15 mg every 4 hours	not compared
Adult, into a vein	1 to 2 mg steps, only in theatre or recovery	not compared
Child, under the skin or into muscle	0.05 to 0.1 mg/kg every 4 hours	not compared
Child, before a dressing	0.2 to 0.5 mg/kg under the skin 60 minutes before if over 1 year, half under 1 year, quarter under 3 months	not compared

Overdose. - **The triad.** WHO names pinpoint pupils, unconsciousness and difficulty breathing. Naloxone reverses it if given in time (WHO 2025). - **Sedation comes first.** The ICRC teaches that sedation precedes the fall in breathing (ICRC 2017). - **Naloxone.** Give it at sedation score 3 or a breathing rate under 8: 0.4 mg diluted to 8 ml, in 1 ml steps, up to 4 mg. A child gets 100 µg/kg, maximum 2 mg. It wears off before morphine does (ICRC 2017).

For the village. Morphine 30 to 60 minutes before a painful dressing is the best-evidenced use (ICRC 2017). It dulls pain but does not abolish it. A salvaged ampoule of known strength is a tool. A home-grown poppy is a gamble, worst in children. Cross-reference: pain medicine (ME-05, not yet written).

1.7 Ethanol: a poor anaesthetic, and why

The tradition. The patient drinks spirits before the knife.

The record. Intravenous alcohol was tried as an anaesthetic, including in Marin's thesis of 1929. It destroyed red cells and scarred veins [VERIFY, secondary]. Trials in the 1960s aimed at 0.2 to 0.4% and caused vomiting [VERIFY, search summary only].

Modern science. The blood alcohol that causes death has a mean and median of 0.36 g%, with a 90% range of 0.21 to 0.50 g% (Jones 2024, abstract). The level needed to dull surgery sits inside that range. Drunk patients also vomit and inhale it, and alcohol adds to the effect of morphine on breathing [VERIFY, standard teaching].

For the village. One drink to calm a frightened adult does little harm. Drinking to insensibility is the error. Alcohol belongs on the skin and the instruments, not in the patient.

1.8 Cold and ice

The record. - **Larrey.** Napoleon's surgeon noticed that frozen soldiers felt less pain at amputation. The observation is usually dated to the retreat from Moscow in 1812. At Eylau in February 1807 he is said to have performed 234 amputations in 24 hours, though secondary sources disagree on the numbers (whonamedit n.d.). - **Arnott.** James Arnott of Brighton numbed skin with two parts crushed ice to one part salt, in gauze, publishing from 1848 (Arnott 1848, PMC record and secondary summary). Ether and then cocaine overtook it. - **Refrigeration anaesthesia.** In the early 1940s Frederick Allen and Lyman Crossman in New York applied a tourniquet to a gangrenous limb, packed it in ice, then amputated. A press report gave mortality for these amputations falling from 83% to 18% (Time 1942). Allen set out the theory in 1944 (Allen 1944, not read). The benefit was probably a cold, shut-down limb in a patient too sick for general anaesthesia [VERIFY, my inference].

Modern science. For a drip, vapocoolant spray lowered pain by 12.5 mm on a 100 mm scale, with moderate-quality evidence, though the spray itself stung (Griffith 2016, summary only). An earlier review found sprays no better than placebo (Hogan 2014, via Wang 2023). A 2023 meta-analysis of 25 studies and 3,143 people found benefit in adults having a vein punctured, but not in children (Wang 2023, summary only). The ICRC uses ice to test spinal block height (ICRC 2017).

For the village. Ice or snow for a minute or two takes the edge off a needle or a splinter. Ice and salt numbs more deeply but can freeze skin. The refrigeration amputation is a district last resort for a dead limb.

1.9 Hypnosis and mesmerism

The record. - **Wellow, 1842.** At Wellow in Nottinghamshire the surgeon W. Squire Ward amputated the leg of James Wombell, a 42-year-old labourer, while the barrister William Topham mesmerised him (Topham and Ward 1842, catalogue and secondary accounts only). When it was read to the Royal Medical and Chirurgical Society on 22 November 1842, members said the patient had simulated insensibility. - **Elliotson.** John Elliotson reported painless operations and published *The Zoist* (Hektoen International 2018). - **Esdaile.** James Esdaile, an East India Company surgeon at Hooghly, operated under mesmerism from 4 April 1845 (Esdaile 1846). His return lists 73 painless operations in eight months to 22 January 1846. They included amputations of an arm and a breast, seven hydroceles, three cataracts, three teeth, five abscesses and 17 scrotal tumours of 8 to 80 lb, of which 14 were painless. He counted 28 such tumours operated since 1839, "and there has not been a fatal case among them" (Esdaile 1846). In three of the 17 mesmerised tumour cases the patient woke. A government committee reported on 9 October 1846, and he was given a Calcutta hospital. - **Mortality.** A claim that his mortality was about 5% against 40 to 50% elsewhere is secondary (Kihlstrom 2000). - **The end.** Ether was demonstrated in Boston on 16 October 1846 and used in London that December. Mesmeric surgery was abandoned within a few years (Hektoen International 2018).

Modern science. - **Montgomery** pooled 18 studies and found a moderate to large effect. The abstract gives no responder rate (Montgomery 2000, abstract). - **Lang's trial** randomised 241 patients having procedures (Lang 2000, abstract): - with self-hypnosis, pain stayed flat - drug use was 0.9 units against 1.9 - haemodynamic instability occurred in 1 patient against 12 - procedures took 61 minutes against 78 - **Tefikow** pooled 34 trials and 2,597 adults

(Tefikow 2013, abstract): - distress g 0.53 - pain g 0.44 (95% CI 0.26 to 0.61) - medication use g 0.38 - recovery and procedure time g 0.25 each - the internal validity of the trials was limited - **Children.** In 59 trials and 5,550 children having needles (Birnie 2018, abstract): - hypnosis reduced pain by a standardised mean difference of 1.40 (5 trials, 176 children) and distress by 2.53 - distraction reduced pain by 0.56 (30 trials, 2,802 children) - breathing reduced pain by 1.04 - evidence quality was low to very low

What it means. Hypnosis reliably reduces pain and fear as an adjunct. It is a sole anaesthetic only for a minority, and even Esdaile's patients sometimes woke. It costs only time and cannot overdose.

1.10 Acupuncture analgesia

The tradition and the propaganda (all via Atwood 2009, a sceptical secondary source): - **Reston.** When the journalist James Reston had his appendix removed in Beijing in July 1971, acupuncture treated his pain afterwards, not during the operation. His report started an American craze. - **Bonica.** John Bonica visited in 1973 and wrote in *JAMA* (Bonica 1974, title only). He judged about 30% of the cases he saw successful. - **The 1974 delegation.** It reported 73% "satisfactory" results in calm, selected patients. Acupuncture was used in only 10 to 15% of operations, often with sedatives and local anaesthetic.

Modern science. - **During surgery.** In 19 trials, 7 were positive, against 2 of the 9 high-quality trials. Real acupuncture did not beat sham, and the authors do not support it during surgery (Lee and Ernst 2005, abstract). - **Chronic pain.** In 39 trials and 20,827 patients, acupuncture beat sham by about 0.2 standard deviations and no acupuncture by about 0.5, fading by about 15% over a year (Vickers 2018, abstract).

For the village. It does not make a procedure bearable, and every needle is a route for infection.

1.11 Distraction, ritual and sucrose for infants

Distraction and ritual. - **Distraction and breathing** help children with needles (Birnie 2018). The ICRC recommends picture books or a blown-up glove (ICRC 2017). - **Ritual.** No trial of ritual itself was found. Preparation and suggestion alone showed no effect in children (Birnie 2018).

Sucrose. A Cochrane review of 74 studies and more than 7,000 infants found that sucrose reduced pain scores (Stevens 2016, abstract): - **Heel prick.** The usual dose was 0.5 ml of 24%, or sucrose on a dummy. It cut the Premature Infant Pain Profile by 1.70 at 30 seconds and 2.14 at 60 seconds. - **Venepuncture.** 2 ml cut the score by 2.79. - **Injection into muscle.** The score fell by 1.05. - **Adverse events** were minor.

It is the cheapest, safest analgesic in this report. The breastfeeding review was not read.

1.12 The analgesic plants

Willow bark (*Salix alba* L., *S. purpurea* L., *S. daphnoides* Vill., *S. fragilis* L. and others, bark). - **Tradition.** Used for pain and fever on several continents. - **Record.** - In 210 patients with back pain, 39% were pain-free in the last week on 240 mg salicin a day, 21% on 120 mg and 6% on placebo. One had a severe allergic reaction (Chrubasik 2000, abstract). - Extract with 240 mg salicin did about as well as rofecoxib 12.5 mg (Chrubasik 2001, abstract). - A review found a dose-dependent effect (Vlachojannis 2009, abstract). - **Two dose sources.** - The EU monograph gives 393 to 1,572 mg of dry extract a day for adults, for no more than four weeks, and contraindicates it under 18 (EMA 2016, search summary only). - A US Pharmacopeia review found no serious adverse effects at 120 to 240 mg salicin a day for up to eight weeks, in adults only (USP 2019, search summary only). - Raw bark varies, so bark tea gives an unknown dose [VERIFY]. - **Science.** Salicin becomes salicylic acid in the body. It acts slowly and modestly, over days. It is not a procedural analgesic. - **Lookalikes.** Poplars (*Populus*) also contain salicylates. No dangerous lookalike was found [VERIFY].

Clove (*Syzygium aromaticum* (L.) Merr. and L.M. Perry, dried flower bud and oil). - **Tradition.** Held against an aching tooth in many traditions. - **Record.** In 73 volunteers, a homemade clove gel numbed the gum as well as 20% benzocaine and better than placebo (Alqareer 2006, abstract). - **Science.** The oil is 60 to 90% eugenol (VUMC 2025), a local anaesthetic. - **Harm.** - 5 to 10 ml of oil swallowed has seriously poisoned infants (VUMC 2025). - One child developed coma, fits, a bleeding disorder and liver damage (Hartnoll 1993, abstract). - **Feasibility.** The tree is tropical, so after the Fall the village has only the cloves it stored [VERIFY].

Thorn apple, henbane and mandrake (*Datura stramonium* L., *Hyoscyamus niger* L., *Mandragora officinarum* L. and *M. autumnalis* Bertol.). All parts contain atropine-like alkaloids, chiefly hyoscyamine and scopolamine (Alizadeh 2014). - **The tradition: the soporific sponge.** Hugh and Theodoric of Lucca soaked a sponge in opium, mandrake and hemlock juice, then held it moistened to the nose. They revived the patient with fennel root and vinegar. It faded by the late sixteenth century as ineffective (De Hert 2025). Juvin and Desmonts (2000, title only) describe how "a universally recommended medical technique was abruptly discarded". Hanaoka Seishū in Japan operated in 1804 under a drink containing thorn apple and monkshood (De Hert 2025). Voigts and Hudson's 1992 study of the English dwale could not be read. - **The record of harm.** - **Texas, 1994.** Two boys of 16 and 17 died after a tea of thorn apple root (CDC 1995). - **New York.** People who ate 30 to 50 seeds hallucinated for up to 36 hours (CDC 1995). - **Dose.** Each seed holds about 0.1 mg of atropine. The adult lethal dose is at least 10 mg of atropine or 2 to 4 mg of scopolamine. Onset is in 30 to 60 minutes and the illness lasts 24 to 48 hours. Potency varies by plant and year (CDC 1995). - **Iran.** In 19 patients, most were children poisoned by accident, controlled with benzodiazepines (Amini 2012, abstract). - **Turkey.** A family was poisoned by dolma stuffed with thorn apple flowers (Disel 2015). - **Lookalikes.** - Henbane root has been taken for parsnip (Alizadeh 2014). - Mandrake leaves have been taken for borage, *Borago officinalis* L. [VERIFY, secondary]. - **Science.** There is no safe dose. Sedation, delirium and death lie close together, and potency is unpredictable.

2. Evidence grades

Remedy or procedure	Grade	Tradition says	Record shows	Science infers
Lidocaine infiltration and field block	A	(modern)	Standard for a century, safe within the dose	Works within minutes, kills above the ceiling
Digital block, plain lidocaine	A/B	(modern)	About 89% success with one volar injection	Easy and safe
Haematoma block	A	(modern)	Inferior to the Bier block in trials, but simpler	Good enough for the village
Bier block (intravenous regional)	A	(modern)	Best wrist analgesia, deaths when the cuff fails	District only
Dental infiltration and nerve block	B	(modern)	Upper infiltration reliable, lower block often fails in pulpitis	Teachable in part
Spinal anaesthesia	A/B	(modern)	6.4 cardiac arrests per 10,000 in France	District only, with resuscitation
Coca leaf, chewed for the mouth	C	Numbs, gives strength	Numbs the mouth for about an hour	Low dose, low reach

Remedy or procedure	Grade	Tradition says	Record shows	Science infers
Topical cocaine solution	B	(modern)	Effective for the nose, causes heart attacks	Not a village drug
Opium and morphine around procedures	A	Kills pain	Effective, with deaths in children and from dosing errors	Use only of known strength
Ethanol to insensibility	X	Dulls the knife	Vomiting, haemolysis	The lethal level overlaps the useful one
Cold spray or ice for needles	A (weak)	Numbs	Small benefit in adults	Cheap adjunct
Ice and salt (Arnott)	B/D	Numbs skin	Used in the 1850s, overtaken	Risk of frostbite
Refrigeration amputation	B	(modern, 1940s)	Lower mortality in one series	Last resort at the district
Hypnosis as adjunct	A	Removes pain	Esdaile's series, modern trials	Moderate effect
Hypnosis as sole anaesthetic	B/D	Painless surgery	Esdaile's 73 cases, with failures	A minority of patients only
Acupuncture for surgery	X	Painless surgery	1970s claims inflated	No better than sham
Acupuncture for chronic pain	A (small)	Relieves	Small effect over sham	Small specific effect
Distraction for children	A (low quality)	(folk)	Modest effect	Free, use always
Sucrose 24% for newborns	A	(modern)	74 studies	Use always
Willow bark	A/B	Pain, fever	Modest effect in back pain	Not for procedures
Clove for toothache	B/C	Numbs tooth	Equal to benzocaine in one trial	Topical only, oil toxic if swallowed
Thorn apple, henbane, mandrake, soporific sponge	X	Sleep for surgery	Abandoned, deaths	No safe dose

3. Means ledger

Rungs: (0) hands and knowledge alone, (1) the hearth, (2) garden and still, (3) village dispensary, (4) district infirmary, (5) the hospital before the Fall, as reference.

Method	Hands alone	Hearth	Garden and still	Village dispensary	District infirmary	Hospital before the Fall
Hypnosis, distraction, breathing	Yes, if trained	Yes	Yes	Yes, taught systematically	Yes	Used as adjunct
Sucrose for infants	No	Yes (sugar, boiled water)	Yes	Yes	Yes	Standard
Cold	Snow in winter	Cold water, snow	Ice house, ice and salt	Same	Ice plus tourniquet for refrigeration amputation	Sprays, ice
Willow bark	No	Bark tea, unknown dose	Dried bark, tincture, weighed	Weighed extract if any	Same	Not used, aspirin instead
Clove	No	Stored cloves	Same	Clove gel	Same	Dental anaesthetics
Coca leaf	No	Only where it grows	Same	Same	Same	Pharmaceutical cocaine for the nose
Opium or morphine	No	No safe form	Poppies grow, dose unknowable	Salvaged morphine of known strength, naloxone	Morphine, naloxone, ketamine	Full range
Lidocaine infiltration and digital block	No	No	No	Yes, with salvaged lidocaine and sterile needles	Yes	Yes
Haematoma block	No	No	No	Yes	Yes	Yes or Bier block
Dental block	No	No	No	Upper infiltration	Lower block	Yes
Bier block	No	No	No	No	Only with a reliable cuff and a line	Yes
Spinal	No	No	No	No	Only with fluids, pressor, airway skills	Yes
Treatment of toxicity (lipid, oxygen, airway)	Recovery position	Same	Same	Benzodiazepine if stocked [VERIFY]	Oxygen if any, lipid if salvaged	Full

What each rung changes. - **Hands and the hearth.** These offer only modest relief: distraction, hypnosis, sucrose

and cold. They make needles and dressings bearable. They do not make a wrist reduction or a tooth extraction painless. - **The garden and still.** These add willow for aches, and the ability to sterilise needles and make alcohol for skin. They add no true local anaesthetic. - **The village dispensary.** This is the decisive rung, if it holds salvaged lidocaine. A trained lay healer can then numb fingers, wounds, abscesses, upper teeth and broken wrists. Most of the village's procedures become bearable, but only while the lidocaine lasts. - **The district infirmary.** This adds the blocks that can stop a heart (spinal, Bier) and the means to rescue it. Major lower-limb and abdominal surgery then becomes possible without general anaesthesia.

Today and after the Fall. Today every rung above the hearth can be stocked. After the Fall, local anaesthetics cannot be made in a village, by this book's rule and in practice. Synthesis of lidocaine needs an industrial chemistry the village does not have [VERIFY, my inference]. The salvaged stock is finite, and its preservation is the single most important supply decision in this report.

4. Harm test

4.1 Local anaesthetics (lidocaine and relatives)

- **How it kills.** By injection into a vein, or by too much total dose, the drug reaches the brain and heart.
- **The signs, in order** (ICRC 2017):
  - first, ringing in the ears and confusion (numb lips or a metallic taste are usual early signs [VERIFY, standard teaching])
  - then seizures
  - then collapse of the circulation
- **The error that harms:**
  - injecting without aspirating first
  - adding up several sites and forgetting the total
  - using 2% when the dose was worked out for 1%
  - repeating the block because the first one has not yet had time to work
- **Who gets less:** the old, the frail, those with liver or kidney disease, and late pregnancy (Rosenberg 2004). The UK licence advises avoiding lidocaine in early pregnancy unless the benefit outweighs the risk (Mercury Pharma 2023).
- **Adrenaline.** Never use adrenaline-containing solution in fingers, toes, ears or penis in the village (Giannou and Baldan 2009). Lalonde (2005) found it safe in hospital practice, but the village lacks the antidote.
- **What to do:** Protocol 5. The ICRC adds that the infusion rate of lipid may be doubled to 30 ml/kg an hour (ICRC 2017).
- **Historical harm.** The AMA committee of 1924 and the FDA reports up to 2023 (Fettiplace 2025).
- **Nerve damage.** Pain or tingling during injection was associated with 21 of 34 nerve injuries in the French series (Auroy 1997). If the patient feels an electric shock or sharp pain, stop and move the needle.
- **Infection.** A dirty needle into a fracture haematoma turns a closed fracture into an infected one [VERIFY, my inference]. Clean the skin and use a sterile needle.

4.2 Spinal anaesthesia

- **How it harms:**
  - a sudden fall in blood pressure, for which nausea is an early warning
  - a high or total spinal that stops breathing
  - cardiac arrest, at 6.4 per 10,000 in France (Auroy 1997)
  - nerve damage
  - headache afterwards, 2.6 to 6.6% depending on the needle (Xu 2017)
  - meningitis from a dirty technique [VERIFY]

- **Who must never receive it:** the dehydrated or bleeding patient whose pressure will collapse, and anyone with infection at the site or a bleeding disorder [VERIFY, standard teaching].
- **What to do:** fluids, raise the legs, a vasopressor if stocked, and ventilate if breathing fails (ICRC 2017).

4.3 Opium and morphine

- **How it kills:** stopped breathing.
- **The error that harms:**
  - confusing strengths, as with tincture and paregoric
  - a home preparation of unknown strength
  - giving a dose to a sleeping patient
  - adding alcohol
  - giving to infants
- **Who must never receive it, or only at reduced dose:**
  - infants under three months get a quarter of the dose (ICRC 2017)
  - the old and the dehydrated need less [VERIFY]
  - head injuries and anyone already drowsy [VERIFY]
- **Signs going wrong:** rising sedation, slow breathing, pinpoint pupils (WHO 2025).
- **What to do:** Protocol 6.
- **Historical harm:** the infant deaths from soothing syrups (THRIVING library, FO-05), the tincture and paregoric confusion (Pharmacy Times 2003), and the poppy seed tea deaths (Powers 2018, CSPI 2021).

4.4 Coca and cocaine

- **How it harms:** a fast heart, abnormal rhythms, high blood pressure, heart attack, seizures, overheating (Medeiros and Rahde 1989, Lutfallah 2023).
- **Who must never receive it:** anyone with heart disease or high blood pressure, and pregnancy [VERIFY].
- **What to do:** a benzodiazepine, cooling and support (Medeiros and Rahde 1989).

4.5 Ethanol

- **How it kills:** stopped breathing and inhaled vomit at levels near those needed to dull surgery (Jones 2024).
- **Who must never receive it:** children, the pregnant, the head-injured, anyone given morphine [VERIFY].

4.6 Cold

- **How it harms:** frostbite from ice and salt, or from ice held too long. Cold injury is worse in limbs with poor circulation, such as in diabetics or the old [VERIFY].
- **The refrigeration amputation** pairs cold with a tourniquet, which kills the limb below it. It is used only on a limb already lost.

4.7 Hypnosis

- **How it harms:** failure. The patient wakes during the procedure, as three of Esdaile's 17 did (Esdaile 1846). False confidence then delays real anaesthesia. Hypnosis can also bring up distressing memories [VERIFY].
- **What to do:** have local anaesthetic ready, and stop if the patient shows pain.

4.8 Acupuncture

- **How it harms:** infection from unsterile needles, a punctured lung from needles over the chest [VERIFY, standard teaching], and false reliance during a procedure.

4.9 Willow

- **How it harms:** allergy (one severe case in Chrubasik 2000) and bleeding.
- **Who must never receive it** (EMA 2016, search summary):
  - children under 18, because of Reye's syndrome
  - people allergic to aspirin
  - people with asthma, an active ulcer or a bleeding disorder
  - the third trimester of pregnancy
  - severe liver or kidney disease
- **Signs:** wheeze, rash, black stools.

4.10 Clove

- **How it harms:** swallowed oil causes coma, fits, liver failure and a bleeding disorder in small children (Hartnoll 1993, VUMC 2025).
- **The error:** leaving the bottle where a child can reach it.
- **What to do:** treat as a severe poisoning. N-acetylcysteine helped in reported cases if available [VERIFY].

4.11 Thorn apple, henbane and mandrake

- **How it kills:** fever, delirium, a racing heart, seizures, coma (CDC 1995).
- **The error:** any use at all. Misidentification is the other error, as with root for parsnip, leaves for borage, and flowers in food (Alizadeh 2014, Disel 2015).
- **Signs** (CDC 1995): the classical anticholinergic picture, that is
  - hot and dry skin
  - wide pupils
  - flushed face
  - delirium
  - a full bladder that will not empty
- **What to do:** keep the patient cool, safe and watched, and give a benzodiazepine for agitation (Amini 2012). Physostigmine is the antidote in hospital (CDC 1995). Expect 24 to 48 hours of illness.

5. Red flags

These signs mean the patient may die or be disabled without what the village cannot give.

- **During a block:**
  - numb lips, ringing ears, confusion, or a fit. This is systemic toxicity (ICRC 2017).
  - **What to do anyway:** stop, put the patient on their side, protect the head, breathe for them if they stop, and wait. Many recover once the drug redistributes [VERIFY].
- **During or after a spinal:**
  - nausea with falling pressure
  - weakness of the arms
  - difficulty breathing
- **After a digital block:**
  - a white or blue finger that does not pink up within an hour [VERIFY]
  - **What to do anyway:** warm the hand and remove any tight dressing or ring.
- **After morphine:**
  - a patient who cannot be roused
  - breathing below 8 a minute
  - pinpoint pupils (ICRC 2017)

- **After a plant remedy:**
  - hot, dry, flushed skin, delirium and a full bladder, after any home-made sleeping draught. This is anticholinergic poisoning.
  - fits or drowsiness in a child after clove oil
- **After a haematoma block or field block:**
  - a hot, swollen, increasingly painful limb over days. This is infection.
- **Honest comfort.** When the village cannot give what the patient needs, it can still give:
  - presence
  - warmth
  - a calm voice
  - hypnosis or guided breathing
  - sucrose for the infant
  - morphine of known strength for the dying, in doses that relieve rather than hasten (cross-reference: palliative care, ME-06, not yet written)

6. The case against

Against salvaged local anaesthetics in lay hands. - **Trained hands only.** The block success rates are from trained hands (NYSORA n.d., Lalonde 2005). - **Weak dose ceilings.** The maximum doses are poorly founded (Rosenberg 2004). - **Lidocaine still kills.** It remains the local anaesthetic most often named in US death reports (Fettiplace 2025). - **No lay evidence.** The task-shifting literature for anaesthesia is thin and conflicting (Health Policy Plan 2023). - **No rescue.** A village healer without oxygen or lipid has no answer to a toxic reaction except to wait. - **The reply.** The doses used in finger, wound and haematoma blocks sit far below the toxic range when they are calculated (Meinig 1989). The alternative is no anaesthesia at all.

Against hypnosis. - **Contemporary critics.** Esdaile's contemporaries, the members of the Royal Medical and Chirurgical Society who heard the Wombell case in 1842, held that patients simulated insensibility (Topham and Ward 1842, secondary accounts). - **Weak trials.** Modern meta-analysts warn that the trials are of limited internal validity (Tefikow 2013) and the children's evidence is of low quality (Birnie 2018). - **Abandonment.** Esdaile's methods were abandoned the moment ether arrived (Hektoen International 2018). - **The reply.** Ether did not come to the village. The trials consistently show an effect as an adjunct.

Against acupuncture. - Lee and Ernst (2005) found no advantage over sham during surgery. Kimball Atwood (2009) argues that the 1970s claims were propaganda. Bonica's own count was modest.

Against the plants. - **The soporific sponge.** It was abandoned because it did not work (De Hert 2025, Juvin and Desmonts 2000). - **Willow.** Its trials are few and many come from one group (Chrubasik 2000, Chrubasik 2001, Vlachojannis 2009). - **Clove.** It rests on one small trial (Alqareer 2006). - **The romance of the herbal.** It is exactly what kills with thorn apple.

Against the romance of the hospital. Spinals, Bier blocks and lipid rescue are real advances. A district that tries to copy them without the means to rescue will kill patients who would have done well with a haematoma block and patience.

7. 10-line summary

1. Most village procedures need local, not general, anaesthesia.
2. Plain lidocaine: the lesser of 3 mg/kg and 200 mg. That is 0.3 ml/kg of 1%, maximum 20 ml. This resolves WO-05.
3. Aspirate before every injection and wait 10 minutes before cutting.

4. Digital, field, haematoma and upper dental blocks are within a trained lay healer's reach. Spinal and Bier blocks belong to the district.
5. Plain lidocaine probably keeps years past expiry if clear and cool. Adrenaline mixtures fail first.
6. Hypnosis is a proven adjunct (pain g 0.44 in adults) but rarely a sole anaesthetic.
7. Acupuncture does not beat sham during surgery.
8. Sucrose 24% for newborns and distraction for children work and cost almost nothing.
9. Morphine of known strength before a dressing is effective. Home opium is a gamble that kills children.
10. Alcohol to insensibility, thorn apple, henbane, mandrake and the soporific sponge are graded X. Clove helps teeth, willow helps aches.

8. Open questions

- **Lay healers.** How safely and successfully can lay healers give digital, haematoma and dental blocks? No study was found.
- **Old lidocaine.** What is the potency and sterility of lidocaine decades past expiry? Zilker (2019) tested procaine, not lidocaine.
- **Plain or adrenaline in fingers.** Should the village use adrenaline in fingers? Lalonde (2005) says it is safe, the ICRC (Giannou and Baldan 2009) says not. This report sides with the ICRC for want of phentolamine.
- **Esdaile's mortality.** Was his mortality for scrotal tumours really 5% (Kihlstrom 2000)? His own book claims no deaths in 28 cases.
- **Who responds to hypnosis.** What share of an unselected village responds to hypnosis well enough for a procedure? Montgomery's abstract does not say.
- **Refrigeration anaesthesia.** What were its outcomes in the original 1940s series? Not read.
- **Willow bark tea.** What is its salicin dose? No assay found.
- **The medieval dwale.** What did it contain? Voigts and Hudson not read.
- **Breastfeeding.** How does breastfeeding compare with sucrose for newborn procedures? Its review was not read.
- **Datura dose.** The figures conflict. They give 0.1 mg atropine per seed in one source and about 6 mg per 100 seeds in another [VERIFY].

9. Sources to read in full

1. Giannou C, Baldan M. *War Surgery*, volume 1, ICRC 2009, chapter 17 on anaesthesia and Table 17.1 (Giannou and Baldan 2009).
2. ICRC *Anaesthesia Handbook* 2017, chapters on regional anaesthesia, pain and toxicity (ICRC 2017).
3. Esdaile J. *Mesmerism in India*, 1846 (Esdaile 1846).
4. Rosenberg, Veering and Urmey 2004 on maximum doses (Rosenberg 2004).
5. Handoll, Madhok and Dodds, Cochrane review of anaesthesia for wrist fractures (Handoll 2002), with Kendall 1997.
6. Birnie 2018 Cochrane review of psychological interventions for needle pain in children (Birnie 2018).
7. Stevens 2016 Cochrane review of sucrose for newborns (Stevens 2016).
8. Lee and Ernst 2005 on acupuncture during surgery (Lee and Ernst 2005).
9. Massie 1946, Hughes 1947 and Noble 1948 on refrigeration anaesthesia (Massie 1946, Hughes 1947, Noble 1948, catalogue records only).
10. King, *Primary Anaesthesia*, and Dobson, *Anaesthesia at the District Hospital* (WHO), which could not be opened here.

10. At the bedside after the Fall

The household. - **Minimum.** Distraction, breathing and simple hypnotic talk for every procedure. Sucrose for infants. Cold water, snow or ice for needles and splinters. Cloves for a toothache, kept away from children. Nothing from the thorn apple family, ever. - **To start:** sugar, a clean cup, a spoon, cloves stored dry, and this chapter's breathing and distraction script. - **First failure to expect:** a well-meant sleeping draught of garden plants, or a drunk patient who vomits.

The village of 300. - **Minimum.** One or two trained lay healers who can: - calculate a lidocaine dose by weight - aspirate and inject slowly - give digital, field, haematoma and upper dental blocks - recognise toxicity - give morphine of known strength before dressings, and watch the patient afterwards - run hypnosis as an adjunct - **To start:** - **The lidocaine stock.** All salvaged lidocaine, gathered, logged and kept cool and dark. Plain kept separate from adrenaline-containing. - **Equipment and drugs.** Sterile needles and syringes, a scale for weighing patients, a written dose table, and naloxone and morphine if any were salvaged. - **Willow bark** for chronic aches in adults. - **Records:** a book of every block, with drug, strength, volume, weight and outcome. - **First failure to expect:** - a block given and the procedure started too soon - a second dose given on top of the first, adding up to toxicity - a 2% vial used as if it were 1%

The district of 3,000. - **Minimum.** - **The village skills,** plus the Bier block and spinal anaesthesia in a nurse's or doctor's hands. - **Rescue equipment:** a working cuff, intravenous fluids, a vasopressor, the means to ventilate by bag and mask, and lipid emulsion if any was salvaged. - **Ketamine** for what blocks cannot do (cross-reference: WO-10, not yet written). - **Refrigeration amputation** for the dying limb in the patient who cannot take anything else. - **To start:** - **Equipment:** an inventory of every local anaesthetic, opioid and antidote in the district, and pencil-point spinal needles. - **Training:** a trained anaesthetic clinician to teach and audit the village healers. - **Supply rules:** a rule that lidocaine is spent only on procedures that cannot be done otherwise. - **First failure to expect:** a spinal in a dehydrated or bleeding patient, whose pressure falls beyond rescue.

11. Protocols

Protocol 1: the lidocaine ceiling (plain lidocaine)

- ☐ Weigh the patient. If no scale, estimate low.
- ☐ Read the vial: 1% is 10 mg per ml. 2% is 20 mg per ml. Check it twice.
- ☐ The ceiling is the lesser of 3 mg/kg and 200 mg (section 1.2) [VERIFY, my arithmetic].

Weight	Max mg	Max ml of 1%	Max ml of 2%
10 kg	30	3	1.5
20 kg	60	6	3
30 kg	90	9	4.5
40 kg	120	12	6
50 kg	150	15	7.5
60 kg	180	18	9
67 kg or more	200	20	10

- ☐ For the old, the frail, liver or kidney disease, or late pregnancy, use about half (WikiMSK n.d.) [VERIFY].
- ☐ Add up every site before starting. The ceiling is for the whole procedure.
- ☐ Never add a second full dose within the same procedure.

Protocol 2: digital block (finger or toe)

- ☐ Plain lidocaine only, never with adrenaline (Giannou and Baldan 2009).

- ☐ Clean the skin at the base of the finger.
- ☐ Use a fine needle. Aspirate before each injection.
- ☐ Inject 2 to 4 ml of 2% (or the same mg as 1%) per digit, split between the two sides at the base of the digit (Giannou and Baldan 2009). Single volar injection at the palm crease is an alternative with about 89% success (NYSORA n.d.).
- ☐ Wait 10 minutes. Test with a needle tip before starting.
- ☐ No ring or tight dressing afterwards. Check the colour of the finger within the hour.

Protocol 3: haematoma block (broken wrist)

- ☐ Calculate the ceiling (Protocol 1). Prefer 1%.
- ☐ Clean the skin over the break on the back of the wrist.
- ☐ Insert the needle into the fracture gap. Aspirate. Dark blood confirms you are in the haematoma (WikEM n.d.).
- ☐ Inject slowly, about 1 ml every few seconds [VERIFY].
- ☐ Wait 10 to 15 minutes. Keep talking with the patient. Ask about tingling lips, ringing ears or strange taste.
- ☐ Reduce and splint (THRIVING library, WO-05).
- ☐ Watch the patient for 30 minutes afterwards. Blood levels peak at 20 to 30 minutes (Meinig 1989).

Protocol 4: field block or infiltration (wound, abscess, small lump)

- ☐ Calculate the ceiling. 1% plain up to 20 ml for an adult of 67 kg or more (Giannou and Baldan 2009).
- ☐ Inject through intact skin at the edge, not through a dirty wound, where possible [VERIFY].
- ☐ Aspirate before each push. Keep the needle moving as you inject.
- ☐ For an abscess, ring it, do not inject into the pus [VERIFY].
- ☐ Wait at least 5 to 10 minutes. Do not cut at once, which is the commonest mistake (Giannou and Baldan 2009).

Protocol 5: when a block goes wrong (toxicity)

- ☐ Stop injecting at the first sign: numb lips, metallic taste, ringing ears, confusion, slurred speech (ICRC 2017, Burch and Stevens 2023).
- ☐ Call for help. Lie the patient on their side. Clear the airway.
- ☐ Oxygen if there is any.
- ☐ If fitting, protect the head and give a benzodiazepine if stocked and trained to do so.
- ☐ If the heart stops, start CPR and keep going. Recovery may take over an hour (ICRC 2017).
- ☐ District: 20% lipid emulsion 1.5 ml/kg over 1 minute, then 15 ml/kg an hour. Repeat the bolus up to twice at 5-minute intervals. Maximum 12 ml/kg (ICRC 2017).
- ☐ Record what was given, how much and when.

Protocol 6: morphine before a painful dressing, and overdose

- ☐ Use only morphine of known strength. Check the label twice. Tincture of opium is 10 mg per ml. Paregoric is 0.4 mg per ml (Pharmacy Times 2003).
- ☐ Adult by mouth: 10 mg (ICRC range 10 to 20 mg, GPnotebook start 5 to 10 mg) about 60 minutes before [VERIFY, timing by mouth inferred from the ICRC subcutaneous timing].
- ☐ Child: under the skin 0.2 to 0.5 mg/kg, 60 minutes before, if over 1 year. Half if under 1 year. Quarter if under 3 months (ICRC 2017).
- ☐ No alcohol. Do not give to a drowsy patient.
- ☐ Check sedation and breathing every 15 minutes for the first hour [VERIFY].

- ☐ If the patient cannot be roused, or breathes under 8 a minute: open the airway, breathe for them, and give naloxone 0.4 mg diluted to 8 ml in 1 ml steps into a vein, up to 4 mg. A child gets 100 µg/kg, maximum 2 mg (ICRC 2017). Watch for at least as long as the morphine lasts.

Protocol 7: sucrose for a newborn's needle or heel prick

- ☐ Recipe for about 24% sucrose: 24 g of white sugar made up to 100 ml with boiled, cooled water [VERIFY, my conversion of the 24% figure in Stevens 2016]. Make fresh each day.
- ☐ Give 0.5 ml for a heel prick, up to 2 ml for venepuncture, on the tongue or on a dummy (Stevens 2016), about 2 minutes before [VERIFY, timing].
- ☐ Hold the baby close. Breastfeeding during the procedure is an alternative.

Protocol 8: talking a patient through a procedure (hypnosis and distraction)

- ☐ Before: explain once, calmly. Agree a stop signal.
- ☐ Ask the patient to fix their gaze, breathe slowly and imagine a safe place in detail [VERIFY, general structure, Lang's script not read].
- ☐ Use calm, positive words. Avoid "this will hurt".
- ☐ Children: picture books, a glove balloon, counting, blowing bubbles or slow breathing (ICRC 2017, Birnie 2018).
- ☐ Always have the local anaesthetic ready. Hypnosis is an adjunct.

Protocol 9: toothache

- ☐ Clove: one whole clove held against the sore tooth, or a little ground clove mixed into a paste and placed on the gum (Alqareer 2006 used a homemade gel) [VERIFY, quantity].
- ☐ Clove oil, if any: a drop on cotton wool on the tooth, never swallowed, and the bottle locked away from children (VUMC 2025) [VERIFY, quantity].
- ☐ Upper tooth to extract: dental infiltration with lidocaine within the ceiling (Protocol 1).
- ☐ Lower back tooth to extract: refer to the district, or expect the block to fail.

Protocol 10: cold before a needle or small cut

- ☐ Ice or snow wrapped in a thin cloth, never directly on skin.
- ☐ Hold for 1 to 2 minutes before a needle [VERIFY, timing not found in a source read].
- ☐ No ice and salt mixture on skin except by a trained hand, because of frostbite.
- ☐ Do not use on limbs with poor circulation.

Protocol 11: suspected thorn apple, henbane or mandrake poisoning

- ☐ Signs: hot dry skin, flushing, wide pupils, delirium, a racing heart, a full bladder (CDC 1995).
- ☐ Keep the patient safe, cool and watched. Remove anything they can harm themselves with.
- ☐ Give a benzodiazepine for agitation if stocked (Amini 2012).
- ☐ Expect 24 to 48 hours of illness (CDC 1995). District: physostigmine if available.
- ☐ Find and destroy the source, and check the rest of the family's food (Disel 2015).

12. Numbers to carry

1. **Plain lidocaine:** the lesser of 3 mg/kg and 200 mg. That is 0.3 ml/kg of 1%, never over 20 ml.
2. **1% is 10 mg per ml. 2% is 20 mg per ml.** Check which before you calculate.
3. **Wait 10 minutes** after a block before cutting or manipulating.

4. **Toxicity starts with** numb lips, ringing ears and confusion. Then fits, then the heart.
5. **Lipid emulsion:** 1.5 ml/kg bolus, then 15 ml/kg an hour (district).
6. **Morphine overdose:** breathing under 8 and cannot rouse. Naloxone 0.4 mg in steps, and watch, because it wears off first.
7. **Tincture of opium:** 10 mg morphine per ml. Paregoric: 0.4 mg per ml. A 25-fold difference.
8. **Sucrose 24%:** 0.5 to 2 ml for a newborn's needle.
9. **Thorn apple:** about 0.1 mg atropine per seed, and no safe dose.
10. **Alcohol:** the blood level that kills (mean 0.36 g%) is about where surgical insensibility starts.

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