IN-07 Antiseptics you can make: alcohol, iodine from seaweed, vinegar, hypochlorite, permanganate, silver, honey

HEALING after the FALL, research library, IN-07

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

Scope, and what this report does not repeat

This report assembles the kill data, the household recipes and the tissue harm of every antiseptic a village could make or keep. It builds on four library reports and does not repeat them. WO-02 covers irrigation, debridement, honey and sugar dressings in depth. WO-12 covers sterilisation of instruments and the kill table for heat and chemicals. HY-05 covers soap, lye, vinegar as a laundry agent, hypochlorite strengths for surfaces and electrolytic chlorine from brine. HY-02 covers water treatment. ME-08 and IN-06 were not in the library when this was written.

Two disagreements in the library are settled here, in section 10. WO-02 found household-bleach versions of Dakin's solution that differ fivefold (0.125% against 0.025%). HY-05 and WO-12 give 0.5% chlorine for blood spills, while WO-12 notes that WHO 2016 uses 1%.

The brief's rule on dangerous substances applies. Recipes with quantities are given only for dilutions of a known bleach, vinegar, boiled water, salt water, honey and sugar, each from two sources where two could be found. Iodine, permanganate, silver, phenol and distilled alcohol are covered as history, evidence, the strength in use and the honest feasibility of making them, not as production methods.

Findings by section

1. The first principle: water does most of the work

Before any antiseptic, copious clean water does most of what a fresh wound needs. WO-02 sets out the trials: drinkable tap water is no worse than saline (Fernandez and Griffiths 2012, via THRIVING library, WO-02), and in the FLOW trial of 2,551 open fractures, gentle flow was as good as high pressure while soap inside the wound raised reoperation from 11.6% to 14.8% (FLOW Investigators 2015, via WO-02).

The ICRC handbook by Robin Gray calls antiseptics in a fresh excised wound "of doubtful value", says undiluted antiseptics harm tissue, and says any that are used must be diluted and washed out with saline (Gray n.d.). Even the German consensus of Kramer and colleagues, the strongest modern case for wound antiseptics, limits them to "strictly defined indications", chiefly the infected or critically colonised wound (Kramer et al. 2018, abstract and secondary summaries).

Two laboratory facts explain why. First, almost every antiseptic kills human cells at the strength sold. Lineaweaver found 1% povidone-iodine, 0.25% acetic acid, 3% hydrogen peroxide and 0.5% hypochlorite all toxic to fibroblasts, though povidone-iodine and hypochlorite had dilutions that still killed bacteria (Lineaweaver et al. 1985a). Ortega-Llamas exposed skin cells to five antiseptics at clinical strength and saw 100% cell death by day 3 with every one

(Ortega-Llamas et al. 2022). Second, blood and pus switch most antiseptics off. Hypochlorite is "substantially inactivated" by blood, and alcohol fixes protein rather than penetrating it (Rutala et al. 2008). Exudate, albumin and blood alter the activity of every antiseptic tested (Babalska et al. 2021).

So the order is always the same: wash dirt and blood away with water, remove dead tissue (WO-02), and only then ask whether a chemical adds anything.

2. Ethanol

The record. The CDC gives the optimum as 60% to 90% ethanol by volume, with activity that "drops sharply" below 50% (Rutala et al. 2008). WHO gives 60% to 80% as most effective and higher strengths as less potent, because proteins do not denature easily without water (WHO 2009, search summary). Aim for the overlap, 60% to 80%.

What it kills. Pseudomonas aeruginosa dies in 10 seconds at 30% to 100%. Staphylococcus aureus and Streptococcus pyogenes need 60% to 95%. Tubercle bacilli died in 15 seconds at 95%. At 60% to 80% ethanol inactivates enveloped viruses, but isopropyl alcohol fails against non-enveloped enteroviruses. Seventy per cent kills tissue-phase fungi in under a minute. Alcohol does not kill spores (Rutala et al. 2008). On hands, an 80% ethanol rub for 30 seconds under the European EN 1500 test gave a mean reduction of 3.86 log10 across 17 laboratories, range 3.07 to 5.18 (Journal of Hospital Infection 2024, search summary), against about 2 log for soap and water in a preprint meta-analysis (medRxiv 2025, not peer reviewed).

On the open wound. No controlled trial of ethanol in wounds was found. Diluted a hundredfold from 70%, it still drove keratinocyte viability to zero by day 14 (Ortega-Llamas et al. 2022). The pain is universally reported but I found no study that measured it [VERIFY]. The CDC records fatal clostridial infections from instruments "disinfected" with alcohol (via THRIVING library, WO-12), so alcohol is never a sterilant.

Making it. A pot still's first run gives low wines of about 25% to 35%. Double distillation gives a heart of about 63% to 70% and triple about 80% to 85%. Only a column still reaches the 96% azeotrope (Wikipedia, Pot still, search summary). Two or three runs reach the useful band, but only a hydrometer confirms it. The killer in home distilling is methanol in spirits made for drinking: 20 of 43 patients died at one Turkish centre during the COVID-19 pandemic (Turkish methanol outbreak 2024), and seven died in Wakiso District, Uganda, in 2017 (Doreen et al. 2020). Antiseptic spirit must be kept where it cannot be drunk [VERIFY, my inference]. Open alcohol loses strength by evaporation [VERIFY]. The WHO local hand-rub formula is in HY-01 (WHO n.d.).

Ruling. Alcohol at 60% to 80% on hands and intact skin: yes. In an open wound: no. Wine and drinking spirits at 40% or less are not reliable antiseptics.

3. Iodine

History. In 1811 the Paris saltpetre maker Bernard Courtois, working seaweed ash during the Napoleonic wars, saw a violet vapour condense into dark crystals. Gay-Lussac named the element in 1813. Courtois manufactured iodine from 1822 and died poor on 27 September 1838 (National Museum of Civil War Medicine n.d.). Coindet treated 150 goitre patients with a tincture in 1819, and Lugol's solution of 1829 was 5% iodine and 10% potassium iodide in water (Wikipedia, Lugol's iodine). After Antietam in 1862 the Confederate general John B. Gordon credited repeated painting of his erysipelas with iodine for saving his arm (National Museum of Civil War Medicine n.d.). Antonio Grossich's tincture skin preparation of 1907 to 1908 was reported at 3% infection against 21% in Genoa (Wikipedia, Tincture of iodine, secondary only [VERIFY]). Povidone-iodine is dated by a United States patent to 1956 (search summaries). I could not confirm the brief's 1955, and a Japanese history gives 1949 [VERIFY].

Strengths and kill data. Pharmacopoeia tincture is about 2% iodine with sodium iodide in about 50% alcohol, and strong tincture about 7% (Wikipedia, Tincture of iodine). Povidone-iodine is used at 5% to 12%. It kills bacteria, fungi and enveloped viruses in 1 to 5 minutes, and dilute solutions of 0.1% to 1% act faster than 10% because more

iodine is free. It is a poor sporicide: 1% needed 28 to 93 minutes for a 99% kill of Bacillus subtilis spores (Babalska et al. 2021). Commercial povidone-iodine has been found contaminated in the bottle (Rutala et al. 2008).

Tissue harm. One per cent povidone-iodine was toxic to fibroblasts, while a 1 in 1,000 dilution was not and still killed bacteria (Lineaweaver et al. 1985a, 1985b). In Ortega-Llamas's cells even a hundredfold dilution killed fibroblasts by day 7 and stopped wound closure (Ortega-Llamas et al. 2022). The Kramer consensus still names povidone-iodine first choice for bite, puncture and gunshot wounds (Kramer et al. 2018).

Thyroid harm. Babalska lists newborns, young children, pregnancy, breastfeeding and thyroid disease as contraindications, and 7 days as the limit of use (Babalska et al. 2021). Aitken and Williams found transient hypothyroidism or raised thyrotropin in 12 to 33 of every 100 preterm infants exposed to topical iodine (Aitken and Williams 2014). When mothers were painted at delivery, 14 of 30 newborns in one study had cord thyrotropin above the control limit, while in 394 women in an iodine-sufficient area newborn thyrotropin was unchanged. Iodine passes into breast milk, and one clinic's recall rate for congenital hypothyroidism fell from 4.47% to 0.74% after it stopped using povidone-iodine in labour (Povidone-iodine and neonatal thyroid studies, search summaries). The risk is greatest for the premature, large areas, long use and iodine-deficient regions.

Water. The EPA gives 5 drops of 2% tincture per litre of clear water, 10 if cloudy, and at least 30 minutes' standing (EPA n.d.). The Wilderness Medical Society equates 5 drops per litre to about 4 mg/L (Backer et al. 2024). The two sources agree. The CDC says iodine does not kill Cryptosporidium, and that pregnant women, people with thyroid problems and anyone needing it for more than a few weeks should not use it (CDC n.d.).

Poisoning and vapour. NIOSH sets a ceiling of 0.1 ppm for iodine vapour and 2 ppm as immediately dangerous to life. Work was impossible at 0.3 ppm, and the odour threshold of about 0.9 ppm lies above the irritant level, so the nose gives no warning (NIOSH n.d.). The lethal oral dose is given as 2 to 3 g (NIOSH n.d.) or 2 to 4 g (AccessMedicine n.d.), the iodine in roughly 100 to 200 mL of 2% tincture [VERIFY, my arithmetic].

Seaweed iodine: what the record shows. About 20 tons of wet seaweed made one ton of kelp ash, and up to 40,000 people in north-west Scotland depended on kelping around 1800 (Except the Kyles blog 2018). Iodine became the main product from the 1840s, centred on Glasgow, with works in Ireland and Brittany, until Chilean nitrate iodine took the market in the 1870s and 1880s (Harper 1974). Yields differ about fivefold: "as little as 22 lbs" from a ton of kelp (Harper 1974) against 0.1% to 0.3% of the ash (search summary). On either figure, 20 tons of wet weed gave between 1 and 10 kg of iodine [VERIFY, my arithmetic]. The industry needed families to cut and burn the weed, strong acid, iron retorts and control of a vapour whose safe limit is a tenth of a part per million. A little iodine goes far, since 1 kg makes about 50 litres of 2% tincture [VERIFY, my arithmetic]. That makes iodine a district or regional trade good, not a household product. Seaweed eaten as food is the household's iodine for the thyroid.

4. Hypochlorite

Semmelweis. In May 1847 Ignaz Semmelweis made the students and doctors of Vienna's First Obstetric Clinic scrub their hands in chlorinated lime. Britannica gives mortality falling from 18.27% to 1.27%, with no maternal deaths in March and August 1848. The 18.3% was April 1847 alone, and a monthly re-analysis gives 10.65% before June 1847 against 1.98% after (Britannica n.d. and secondary summaries). Even the conservative figure is a fivefold fall. It was hand antisepsis, not wound antisepsis.

Bleaching powder. Charles Tennant patented chlorinated lime in 1799. It holds about 30% to 35% available chlorine and keeps if dry, while calcium hypochlorite (HTH) holds 65% to 70% and keeps about two years unopened (UNICEF n.d., search summary). Old shop powder was often weak (Fay n.d.). Moisture destroys both.

Dakin and Carrel. Dakin's BMJ paper of 1915 described hypochlorite neutralised with boric acid so that it would not irritate (Dakin 1915, record only). Secondary sources give about 0.5%, made from chlorinated lime and sodium carbonate, filtered, with every batch titrated (Keyes et al. 2023, Chemistry World n.d.). Carrel ran it into the wound

through tubes about every two hours. It needed a laboratory and constant nursing, and lost to excision (THRIVING library, WO-02).

Kill data. Without organic load, under 5 ppm kills vegetative bacteria in seconds, and 100 ppm kills a million to ten million S. aureus, Salmonella and P. aeruginosa in under 10 minutes. About 1,000 ppm is needed for M. tuberculosis. 200 ppm inactivates 25 viruses in 10 minutes and 500 ppm inhibits Candida in 30 seconds. 100 ppm killed 99.9% of B. atrophaeus spores in 5 minutes, and 5,000 ppm (0.5%) inactivates a million C. difficile spores in 10 minutes or less (Rutala et al. 2008). It is the only agent in this report that kills spores at usable strength. Its weakness is blood: at 2,500 ppm it worked with up to 10% plasma and failed beyond. It corrodes metal above about 500 ppm and releases chlorine gas with acid or ammonia (Rutala et al. 2008, THRIVING library, HY-05).

Tissue toxicity, the debate. - Heggers and colleagues tested 0.25%, 0.025% and 0.0125%. Bacteria died at 0.025% and above. Tissue toxicity appeared at 0.25%, in vitro and in vivo, but not at 0.025%. Below 0.025% it no longer killed. They concluded that 0.025% keeps the kill without harming healing (Heggers et al. 1991). - Lineaweaver's companion paper found 0.5% diluted 1 in 100, that is 0.005%, still bactericidal and not toxic to fibroblasts (Lineaweaver et al. 1985b). - Babalska gives wound strengths in use as 0.004% to 0.03%, with fibroblasts inhibited above 0.05% and necrosis at 5% to 10% (Babalska et al. 2021). - StatPearls says most hospitals now use 0.025%, and that "half" and "quarter strength" labels confuse providers (Keyes et al. 2023).

One study found only 24% of fibroblasts alive after 30 minutes in unbuffered 0.025% [VERIFY], so contact should be a rinse, not a long soak. In Ortega-Llamas's comparison hypochlorite was the least harmful of five antiseptics to both skin cell types (Ortega-Llamas et al. 2022). That is the strongest reason to make it the village's one wound antiseptic.

Making it. HY-05 gives the dilution rule and the electrolytic route from brine. Dilute solutions must be made daily: dilute hypochlorite in an opaque bottle loses 40% to 50% a month (Rutala et al. 2008), and unstabilised electrolytic product falls below 90% of strength in about 6 days (Iqbal et al. 2016, via HY-05). Bleach labels were off by an average of 35% (Lantagne, via THRIVING library, HY-02), so untested salvaged bleach is assumed to be at half strength (HY-05).

5. Vinegar and acetic acid

Kill data. Vinegar is a narrow antiseptic. Household vinegar gave under 3 log against S. aureus and E. coli where bleach gave over 5.6 log, and it did not inactivate poliovirus (Rutala et al. 2000, via THRIVING library, HY-05). One per cent vinegar failed against pandemic influenza where 10% malt vinegar worked (Greatorex et al. 2010, via HY-05). Its strength is against Gram-negative bacteria, above all Pseudomonas aeruginosa, the cause of green pus and the sweet grape smell of a burn. Halstead and colleagues found inhibitory concentrations of 0.16% to 0.31% for 29 wound isolates, prevention of biofilm at 0.31% and eradication of mature biofilm after 3 hours (Halstead et al. 2015). Ryssel found 3% strongly bactericidal against Gram-negatives including Acinetobacter, and also against MRSA (Ryssel et al. 2009).

Clinical evidence. Madhusudhan randomised chronic wounds infected with P. aeruginosa to 1% acetic acid or saline dressings twice daily, without systemic antibiotics. Acetic acid cleared Pseudomonas in about 4.5 days whatever its resistance, against 11.5 days for susceptible and 15.5 days for multidrug-resistant strains with saline ($P<0.001$) (Madhusudhan 2016). I could not read the sample size. Sloss cleared Pseudomonas from 14 of 16 wounds within two weeks with 0.5% to 5% (Sloss et al. 1993, via HY-05). Nagoba's review collects older series from an advocate's standpoint (Nagoba et al. 2013).

Tissue harm. Lineaweaver found 0.25% acetic acid toxic to fibroblasts at every bactericidal dilution and slowing epithelialisation in animals (Lineaweaver et al. 1985a). Above 2% it causes pain and at 5% or more burning, and UK burns units settled on 2.5% to 3% as tolerable (search summaries). "Cleaning vinegar" can be 35% acid and is corrosive.

Strength. Table vinegar is about 4% to 6% acetic acid, and home-made vinegar is weaker and unknown (HY-05). The useful band, 0.25% to 3%, is wide enough that this matters less than for other agents. The recipes, from two dermatology handouts, are in Protocol 4.

6. Potassium permanganate

History. Henry Bollmann Condy, an English chemist, patented "Condy's fluid" in 1857 and later sold the dried salt as Condy's crystals (Wikipedia, Henry Bollmann Condy, search summary). It was used on wounds, in water and as a douche.

Strength and kill data. The working strength is 1 in 10,000 (0.01%). The British Association of Dermatologists gives one tablet in 4 litres of warm water, fully dissolved, light pink, never darker, made fresh each time, with hands or feet soaked for 10 to 15 minutes (BAD n.d.). DermNet, an Irish children's hospital and the Bath formulary agree that one 400 mg tablet in 4 litres gives 1 in 10,000 (search summaries). The antibacterial evidence is thin. Lundgren and Sonesson found S. aureus completely killed at 0.05%, five times soak strength, biofilm formation inhibited at 0.01%, and established biofilm eradicated only at 1% (Lundgren and Sonesson 2024). A wound-care evidence summary called the evidence "very limited" (WHAM n.d.). Its real use is drying weeping, blistered or infected eczema and leg ulcers.

Harm. Crystals and strong solutions burn. Vaginal use as an abortifacient caused burns and severe bleeding, reported in Boston in 1945 and in four cases by Bookrajian and Wagner in 1952, all bleeding (search summaries). A child suffered perianal burns from crystals (search summary). Swallowing kills. NHS England issued a safety alert in December 2014 after concentrate was given in cups and jugs, and a joint alert with the BAD in April 2022 after an older woman died from laryngeal swelling and aspiration after swallowing tablets left at her bedside (NHS England 2014, 2022). The adult lethal dose is about 5 to 10 g, with airway swelling first and liver, clotting and kidney failure up to 36 hours later (Potassium permanganate poisoning case reports). In a BAD survey 35% of dermatologists did not know how much water a tablet needs (BAD 2022). It stains skin, cloth and basins brown.

Making it. It needs manganese ore, potash, fusion and an oxidation step. No village record of making it was found [VERIFY]. It is a salvage item. Crystals without tablets need a scale, since 1 in 10,000 is 0.1 g per litre [VERIFY, my arithmetic], which cannot be judged by eye. The colour is the check: light pink.

7. Silver

Credé. In 1880 and 1881 Carl Credé, at the Leipzig maternity hospital, put one drop of 2% silver nitrate in each newborn's eyes against gonococcal ophthalmia, then the leading cause of childhood blindness in Europe. Sources give the fall in different forms: 7.6% to 0.5%, 10% to 0%, or 13.6% to 0.05%. The brief's 10.8% to 0.2% I could not find (search summaries). The drops caused chemical conjunctivitis so often that 1% became standard. A German survey in 1993 found a reaction in 5% to 10% of newborns, non-gonococcal ophthalmia under 0.1% with prophylaxis, and up to 5% conjunctivitis in hospitals without it (Hoyme 1993).

The modern trials are less dramatic. Kapoor's Cochrane review found that prophylaxis probably reduces all-cause conjunctivitis in the first month (RR 0.65, 95% CI 0.54 to 0.78, 8 studies, 9,666 newborns, moderate certainty), but the gonococcal estimate rested on 9 cases and was uninformative (RR 0.79, 0.24 to 2.65) (Kapoor et al. 2020). In Isenberg's Kenyan trial infectious conjunctivitis followed 13.1% of newborns given 2.5% povidone-iodine, 17.5% given silver nitrate and 15.2% given erythromycin (Isenberg et al. 1995). Where gonorrhoea is common and nothing else exists, Credé's drop is still worth having. A village cannot make silver nitrate, so it is a salvage or district item.

Silver nitrate on burns. Moyer's group soaked large burns in 0.5% silver nitrate from 1965. The hypotonic solution drew out up to 350 mmol of sodium a day per square metre of burn, causing dangerous low sodium in children, and wound bacteria turned nitrate to nitrite, causing methaemoglobinaemia with grey skin and normal arterial oxygen (Moyer et al. 1965, search summaries).

Silver sulfadiazine and dressings. Charles Fox introduced silver sulfadiazine in 1968 against Pseudomonas in burns (Fox 1968). Storm-Versloot's Cochrane review of 26 trials and 2,066 patients found three burn trials with significantly more infection on silver sulfadiazine, and concluded there was insufficient evidence that silver prevents infection or helps healing (Storm-Versloot et al. 2010). Norman's Cochrane review of antiseptics for burns found that honey probably heals burns faster than silver sulfadiazine and other topical antibiotics (hazard ratio 2.45, 95% CI 1.71 to 3.52, moderate certainty) (Norman et al. 2017). Kramer's consensus calls silver sulfadiazine "dispensable" (Kramer et al. 2018). Silver and povidone-iodine must not be combined (Babalska et al. 2021).

Colloidal silver. Silver has no known function in the body. The US FDA ruled in 1999 that colloidal silver products are not recognised as safe and effective. NCCIH says argyria, a blue-grey discolouration of skin, is usually permanent, and that silver by mouth reduces absorption of some antibiotics and of thyroxine (NCCIH n.d.). There is no case for making or drinking it.

8. Honey and sugar

WO-02 covers honey and sugar dressings, including Jull's 2015 Cochrane review of 26 trials and 3,011 people: partial-thickness burns healed 4.68 days faster with honey (95% CI 4.28 to 5.09), other wounds gave mixed results, and Jull advised against routine use for most wounds (THRIVING library, WO-02). This section adds kill data and hazards.

Kill data. Cooper, Molan and Harding tested 58 S. aureus isolates from wounds. Manuka honey stopped all of them at 2% to 3% and a pasture honey at 3% to 4%, leaving room for seven to fourteenfold dilution by exudate (Cooper et al. 1999). Allen, Molan and Reid found activity in 345 New Zealand honeys ranging from under 2% to 58% phenol-equivalent (Allen et al. 1991). Ordinary honey works largely by hydrogen peroxide, which catalase in wound tissue destroys. Manuka's extra activity comes from methylglyoxal, which catalase does not touch (search summaries).

Manuka against ordinary honey. I found no clinical trial comparing the two on wounds [VERIFY]. Every honey also works by sugar concentration, and Subrahmanyam's burn trials used local unprocessed honey (WO-02). Vendor activity ratings are commercial claims.

Hazards. Clostridium botulinum spores were found in 26% of Danish samples in one survey and in 7% of 587 US samples, and in none of 122 UK samples (search summary of a review). Counts are low and honey cannot be made spore-free. Honey by mouth is never given to a child under 12 months. No wound infection from honey was found (WO-02). Heating to 120 °C for 10 minutes kills spores but destroys the activity (Simon 2009, via WO-02). Sugar from a sealed bag avoids the question.

9. The tradition: wine, urine and salt water

Wine. The Hippocratic writings had wounds washed with wine (search summary). In the thirteenth century Hugh of Lucca and Theodoric Borgognoni wiped wounds with lint soaked in warm wine and rejected "laudable pus", and Henri de Mondeville carried the method to Paris (Wikipedia, search summaries). Weisse and colleagues found wine as potent as bismuth salicylate against bacteria of traveller's diarrhoea while dilute ethanol alone did nothing (Weisse et al. 1995). No trial of wine on wounds exists. The tradition was right that a clean, dry wound beats a poulticed one, and wine was cleaner than most liquids in 1250. At 12% to 14% ethanol it is far below antiseptic strength.

Urine. Urine therapy runs from the Ebers papyrus to Pliny (search summary). Urine is not sterile: enhanced culture found bacteria in 52 of 65 catheter samples from women's bladders (Hilt et al. 2014). Its urea is far below antibacterial strength [VERIFY]. A Cleveland Clinic urologist said it has no antiseptic properties (search summary). It is worse than any clean water.

Salt water. Normal saline is 0.9%, 9 g per litre. Almroth Wright championed hypertonic salt against Carrel-Dakin in the First World War (WO-02). The trials put saline and drinkable tap water level (WO-02). Salt adds comfort, since saline does not sting, not killing power. Sea water is not sterile and is no substitute for boiled water [VERIFY].

Survivor bias. All three traditions are remembered through the wounds that healed. Most clean wounds heal whatever is poured on them, so the remedy takes the credit.

10. Reconciling the library

Dakin's strengths (WO-02). WO-02 found 0.125% (CHOC) and 0.025% (ICRC and Familiprix) and treated both as above the non-toxic level. That second point needs correcting. WO-02 attributed a non-toxic level of 0.005% to Heggers 1991, but Heggers's abstract puts the threshold at 0.025%, toxic at 0.25%, and calls 0.025% the therapeutic strength (Heggers et al. 1991). The 0.005% figure belongs to Lineaweaver's 1985 companion paper (Lineaweaver et al. 1985b). The ruling of this report: - **0.025% is the standard wound strength** for household and village. Three independent sources support it (Heggers et al. 1991, Keyes et al. 2023, Giannou and Baldan 2009 via WO-02), and Babalska's range of 0.004% to 0.03% contains it. - **0.125% is a short-course strength** for a heavily contaminated, sloughy or necrotic wound for a few days, at the dispensary, never as a routine. It sits above Babalska's fibroblast-inhibition threshold of 0.05% (Babalska et al. 2021). - Full-strength Dakin (0.5%) is a surface disinfectant, not a wound solution.

Blood spills (HY-05 against WO-12). HY-05 and WO-12 use 0.5% for 10 minutes after the bulk has been wiped up. WHO 2016 and NHS England use 1% (10,000 ppm), but NHS England applies it directly to the spill as granules or soaked towels for 3 minutes, before cleaning, then follows with 1,000 ppm (NHS England 2022, search summary). The CDC and OSHA accept anywhere from 1 in 10 to 1 in 100 of household bleach after initial cleaning, depending on how much organic matter remains, and the CDC warns that even 1 in 10 may not fully inactivate high virus titres in large volumes of blood (CDC, OSHA, search summaries). The two library figures answer different situations. The ruling: wipe the bulk up first, then 0.5% for 10 minutes. Where the blood cannot be wiped up first (a large pool, a porous floor, a mattress) or the bleach strength is unknown, use 1%. Both sources are right in their own case.

11. The one-page antiseptic table

Agent	Working strength	Contact time	Vegetative bacteria	Spores	Fungi	Viruses	In blood or pus	Living tissue	Keeps	Household can make?
Boiled water, saline 0.9%	9 g salt per litre	Wash until clean	Removes, does not kill	No	No	No	Washes them away	Harmless	24 hours covered	Yes
Ethanol	60% to 80%	30 seconds wet	Yes, seconds	No	Yes, under 1 minute	Enveloped yes, others poor	Fixed by protein	Kills cells, stings	Years sealed	With a still, two or three runs
Tincture of iodine	2%	1 to 2 minutes, dry	Yes	Poor	Yes	Most	Weakened	Irritant, thyroid	Months [VERIFY]	No, salvage or district trade

Agent	Working strength	Contact time	Vegetative bacteria	Spores	Fungi	Viruses	In blood or pus	Living tissue	Keeps	Household can make?
Povidone-iodine	10% skin, 1% or less wounds	1 to 5 minutes	Yes	1% needs 28 to 93 minutes for 99%	Yes	Most	Weakened	Toxic to fibroblasts, thyroid	Years sealed [VERIFY]	No, salvage
Hypochlorite, wound	0.025%	Rinse, then wash off	Yes, at low load	No at this strength	Partly	Partly	Inactivated	Least harmful in cell work	Make daily	Yes from known bleach
Hypochlorite, surface	0.5% (1% on unwiped blood)	10 minutes	Yes, 6 to 7 log at 100 ppm	Yes, 10^6 C. difficile in 10 minutes	Yes	Yes	Inactivated	Burns tissue	Make daily	Yes from known bleach
Vinegar (acetic acid)	0.25% to 1% wounds, up to 3% burns	10 to 30 minutes, twice daily	Gram-negatives, Pseudomonas, under 3 log for staphylococci	No	Some	Weak at 1%	Partly	Toxic to fibroblasts, stings above 2%	Indefinitely [VERIFY]	Yes
Potassium permanganate	1 in 10,000, light pink	10 to 15 minutes	Weak at this strength	No	Some [VERIFY]	Not shown	Inactivated [VERIFY]	Burns as crystals	Make each time	No, salvage, needs a scale
Silver nitrate	1% eye, 0.5% burns	Single drop, or soaks	Yes	No [VERIFY]	Some	Not shown	Precipitated by chloride [VERIFY]	Chemical conjunctivitis, sodium loss	Dark bottle [VERIFY]	No
Honey	Undiluted, under a dressing	12 to 24 hours	Yes, MIC 2% to 4%	Can carry spores	Some [VERIFY]	Not shown	Works, diluted by exudate	Gentle, about 5% sting	Years sealed [VERIFY]	Yes, beekeeping
Sugar	Packed into the cavity	Change 1 to 2 times a day	Yes, by water activity	No	Partly	Not shown	Dissolves in exudate	Gentle	Indefinite dry	Yes

Agent	Working strength	Contact time	Vegetative bacteria	Spores	Fungi	Viruses	In blood or pus	Living tissue	Keeps	Household can make?
Hydrogen peroxide	3%	Seconds	Yes	No	Partly	Partly	Destroyed by catalase	Toxic, gas embolism	Months	No
Colloidal silver	None	None	Not shown in people	No	No	No	n/a	Argyria if swallowed	n/a	Do not make
Urine, wine	None	None	Not reliably	No	No	No	n/a	Contaminates	n/a	Do not use

Sources: Rutala et al. 2008, Babalska et al. 2021, Heggers et al. 1991, Halstead et al. 2015, Madhusudhan 2016, BAD n.d., Cooper et al. 1999, Kramer et al. 2018, and the library reports WO-02, WO-12 and HY-05.

12. The wound-cleaning rule

The rule below follows from the trials in WO-02, the ICRC stance (Gray n.d.), the cell toxicity data (Lineaweaver et al. 1985a, Heggers et al. 1991, Ortega-Llamas et al. 2022) and the indications of the Kramer consensus (Kramer et al. 2018). The wording is my synthesis [VERIFY].

1. **Every fresh wound gets water, not antiseptic.** Drinkable or boiled water, poured until no more dirt comes out and then as much again. Soap and antiseptic go on the skin around the wound, not in it.
2. **An antiseptic helps in four cases only.** (a) The wound is already infected: pus, spreading redness, smell. (b) It is grossly contaminated with soil, faeces or saliva and cannot be fully cleaned or trimmed. (c) Green pus or a sweet grape smell, which points to Pseudomonas: vinegar. (d) A burn or a sloughy, smelly wound: honey or sugar.
3. **Use the weakest antiseptic that does the job, for the shortest time.** Hypochlorite 0.025% or vinegar 0.25% to 1%, rinse or soak, then boiled water. Stop once the wound is clean, red and granulating.
4. **Clean first.** Blood, pus and dead tissue switch antiseptics off. A chemical poured onto pus does almost nothing.
5. **Never in a wound:** neat alcohol, neat bleach, permanganate crystals or any solution darker than light pink, hydrogen peroxide in deep or closed wounds, urine, or any salve that has not been tested.
6. **Never by mouth:** permanganate, iodine tincture, silver, bleach, antiseptic spirit.
7. **Never on a newborn or a pregnant or breastfeeding woman:** iodine on large areas or for days. Use boiled water, and chlorhexidine if salvaged.

Evidence grades

Remedy or practice	Grade	Tradition	Record	Inference
Copious drinkable water or saline for fresh wounds	A	Universal	Trials equal to saline (WO-02)	Removes load without harming tissue
Ethanol 60% to 80% on hands and intact skin	A	Wine and spirits on wounds	Hand-hygiene and surgical-site trials (WO-12, HY-01)	Fast, broad, no spores

Remedy or practice	Grade	Tradition	Record	Inference
Ethanol in open wounds	X	Common folk practice	No benefit shown, cell death	Harmful, painful
Hand antisepsis with chlorinated lime (Semmelweis)	B	None before 1847	Fivefold fall in maternal death	Applies to any hand antiseptic
Tincture of iodine 2% on intact skin before surgery	B	Civil War to 1950s	Grossich series, secondary only	Works, irritant
Povidone-iodine in bite, puncture, gunshot wounds	B	Twentieth century	Consensus, small trials (Kramer et al. 2018, WO-02)	Reasonable where salvaged
Iodine water treatment, 5 drops per litre, short term	B	Military, wilderness	Agency guidance	Safe for weeks, not Cryptosporidium
Iodine on newborns, pregnant women, large areas	X	n/a	Thyroid suppression in 12 to 33 per 100 preterm	Avoid
Iodine made from seaweed by a village	D	Nineteenth-century industry	Needed acid, retorts, a works	Not a village process
Hypochlorite 0.025% for infected or dirty wounds	B	Carrel-Dakin 1915	Heggers 1991, hospital practice	The village's best wound antiseptic
Hypochlorite 0.125% or stronger as routine wound wash	X	Quarter-strength Dakin	Fibroblast toxicity above 0.05%	Short courses only
Acetic acid 1% for Pseudomonas wounds	B	Vinegar in many cultures	One RCT, case series	Useful, narrow
Potassium permanganate 1 in 10,000 for weeping skin	C	Since 1857	Long use, weak trials	Drying agent more than antiseptic
Permanganate crystals on skin or in the vagina	X	Folk abortifacient	Burns, haemorrhage, deaths	Never
Silver nitrate 1% to 2% eye prophylaxis in newborns	B	Credé 1881	Large falls in ophthalmia, Cochrane RR 0.65 all-cause	Real benefit where gonorrhoea is common
Silver sulfadiazine and silver dressings	X for routine use	1968 onward	Cochrane: no benefit, possibly more infection	Honey better for burns
Colloidal silver by mouth or on wounds	X	Vendor claims	Argyria, no benefit	Never

Remedy or practice	Grade	Tradition	Record	Inference
Honey on partial-thickness burns	A	Universal	Cochrane, Jull 2015	Good, with spore caution
Honey by mouth under 12 months	X	n/a	Infant botulism	Never
Wine on wounds	D	Hippocratic, medieval	No trial	Too weak, better than dirty water
Urine on wounds	X	Ebers papyrus, Pliny	Not sterile, no trial	Use only if no water exists
Hydrogen peroxide in deep wounds	X	Twentieth century	Gas embolism, deaths (WO-02)	Never in cavities

Means ledger

Rung	What it can do	What changes in the outcome
Hands and knowledge alone	Choose the cleanest running water, irrigate, remove dirt by hand, keep the wound open and covered with clean cloth. Refuse urine, neat spirit, crystals and salves.	Most of the benefit of wound cleaning, which comes from water and debridement, is already here.
The hearth	Boiled water and 0.9% saline. Vinegar at 0.25% to 1%. Honey and sugar dressings. Known household bleach diluted to 0.025% for wounds and 0.5% for surfaces. Soap for skin and hands.	Adds a reliable wound antiseptic (dilute bleach) for infected wounds, a Pseudomonas treatment (vinegar) and a burn dressing (honey). Bleach runs out, and unlabelled bleach is a guess.
Garden and still	Ethanol at 60% to 80% from two or three pot-still runs, checked with a hydrometer. Bees for honey. Beeswax and soap. A kitchen scale for salvaged permanganate. Electrolytic hypochlorite from brine with a purpose-made cell and a battery (HY-05).	Hand and skin antisepsis without bleach. A renewable chlorine supply, which is the largest step on the ladder.
Village dispensary	Salvaged povidone-iodine, tincture of iodine, chlorhexidine, permanganate tablets and silver nitrate. Chlorine test kits. A trained lay healer who keeps the dilution book. A microscope to see bacteria in pus [VERIFY].	Bite and puncture wounds get povidone-iodine. Eye prophylaxis for newborns where gonorrhoea is known. Strength testing ends the guessing.

Rung	What it can do	What changes in the outcome
District infirmary	Iodometric titration of hypochlorite (HY-05). Batch records. Stock of silver nitrate for Credé drops. A coastal district might trade for or cooperate on iodine from kelp, with the acid and vapour control that implies.	Measured solutions, longer courses safely run, a sterile room for burns with honey dressings.
Hospital before the Fall	Chlorhexidine-alcohol skin preparation, octenidine, polihexanide, hypochlorous acid, medical-grade honey, negative-pressure wound therapy, systemic antibiotics, grafting.	Grafting beats honey by 13.6 days for burns (WO-02), and systemic antibiotics treat spreading infection, which no antiseptic does.

Harm test

Ethanol. Kills exposed cells and causes pain that makes people stop cleaning. Burns near flame. Drunk, it poisons, and badly run stills add methanol. Never in a wound for anyone. Signs: a wound turning pale and failing to granulate. Remedy: stop and irrigate with water. Historical harm: fatal clostridial infections from alcohol-"disinfected" instruments (via WO-12) and methanol outbreaks (Turkish methanol outbreak 2024, Doreen et al. 2020).

Iodine. Suppresses the thyroid of premature and newborn infants (12 to 33 per 100 preterm exposed, Aitken and Williams 2014) and of the unborn and breastfed. Causes acidosis and kidney harm on large wounds and burns (via WO-02). Corrosive when swallowed, 2 to 4 g lethal. Vapour is dangerous at 2 ppm. Must not be used on newborns beyond a small area, in pregnancy or breastfeeding on large areas, for more than 7 days, or with silver (Babalska et al. 2021). Remedy: stop, wash off, seek the district.

Hypochlorite. Kills tissue above about 0.05% in wounds, burns skin and eyes at surface strength, and releases chlorine gas with vinegar, urine, acid or ammonia (HY-05). The common error is a wrong dilution: a heaped spoon for 5 mL, or industrial bleach taken for household [VERIFY]. Signs: wound edges turning white or grey, burning that lasts, cough near mixing. Remedy: flood with water, fresh air.

Vinegar. Toxic to fibroblasts and painful above 2%. Concentrate at up to 35% burns. Gas with bleach. Graft sites and infant skin are most at risk [VERIFY]. Remedy: dilute further or stop.

Potassium permanganate. Crystals and dark solutions burn skin and vagina. Swallowing 5 to 10 g kills through airway swelling and later organ failure. Children and confused elders swallow it. Signs: drooling, hoarseness or noisy breathing after swallowing. Remedy: a small glass of milk or water and urgent help (BAD n.d.), keeping the airway open, which a village may not manage.

Silver. Chemical conjunctivitis in newborns (5% to 10%, Hoyme 1993), sodium loss and methaemoglobinaemia from 0.5% soaks on large burns (Moyer et al. 1965), and permanent argyria and drug interactions from colloidal silver (NCCIH n.d.). Remedy: stop silver.

Honey. Infant botulism if fed under 12 months, stinging in about 5% (WO-02), fermentation if diluted and stored [VERIFY]. Signs in a baby: constipation, weak cry, poor feeding, floppiness [VERIFY]. Remedy: urgent help.

Folk practices. Urine adds bacteria. Salves of dung, soot or soil carry tetanus [VERIFY]. Hydrogen peroxide in a closed cavity can cause gas embolism, with UK deaths reported (MHRA 2014, via WO-02).

Red flags

These signs mean the wound has gone beyond what any antiseptic can reach: - **Spreading redness, red streaks up the limb, fever or rigors.** The infection is in the tissue or the blood. Antiseptics act only on the surface. Open the wound, drain pus, irrigate, keep the limb raised, and send for antibiotics if any exist (WO-02). - **Crackling under the skin, a sweet or foul smell, grey-brown watery discharge, rapid pulse and pain out of proportion.** Gas gangrene. Without surgery to remove dead muscle it kills within days. - **Stiff jaw, spasms, arching of the back.** Tetanus. No antiseptic prevents it once spores are in dead tissue. Clean and trim the wound, and keep the patient quiet, dark and fed. - **Burns over a large area, or deep white and painless burns.** These need fluids and grafting. Honey helps partial-thickness burns but cannot replace skin. - **A newborn with sticky, swollen eyelids in the first days.** Possibly gonococcal ophthalmia, which can blind within days. Wash the eyes often with boiled water and get any antibiotic or antiseptic eye drops the district has [VERIFY]. - **After swallowing permanganate, iodine, bleach or antiseptic spirit:** drooling, hoarseness, noisy breathing, vomiting blood or confusion. The airway may close.

Honest comfort: when infection has spread beyond the wound and no antibiotic exists, many people still recover, because the body's own defences do most of the work once the wound is open and draining [VERIFY]. Keep the person warm, give fluids, relieve pain, keep the wound clean and open, and stay with them. Where death is near, clean dressings and the removal of smell are a real kindness to the patient and the family.

The case against

Against antiseptics in wounds. Almroth Wright and Alexander Fleming argued in the First World War that antiseptics cannot reach bacteria in the recesses of a wound and kill the white cells that defend it (WO-02). Lineaweaver and later cell studies confirmed the toxicity (Lineaweaver et al. 1985a, Ortega-Llamas et al. 2022), and the irrigation trials show water and debridement do most of the work (WO-02). On this view a village should spend its effort on clean water and a skilled debrider, and keep antiseptics for hands, skin and surfaces.

Against water alone. Kramer and the German wound-antisepsis consensus argue that infected and critically colonised wounds, and bite, puncture and gunshot wounds, need antiseptics, and that cell cultures overstate the harm in living wounds (Kramer et al. 2018). Madhusudhan's trial and the Carrel-Dakin record support them. With no systemic antibiotics after the Fall, an antiseptic may be the only way to cut a surface load. This report takes the middle course: water for every wound, dilute hypochlorite or vinegar for the infected one.

Against honey. Jull, lead author of the Cochrane review, advised against routine use for most wounds, and most burn trials came from one investigator, M. Subrahmanyam (WO-02).

Against silver. Storm-Versloot found no good evidence for silver dressings and some evidence of harm from silver sulfadiazine (Storm-Versloot et al. 2010). Even Credé's drop rests more on history than on modern trials (Kapoor et al. 2020).

Against permanganate. Evidence of antiseptic action at 1 in 10,000 is very weak (WHAM n.d., Lundgren and Sonesson 2024), and the harms are documented (NHS England 2014, 2022). A village might do better without it.

Against the romance of the old, and of the new. Wine, urine and salt water owe much of their reputation to survivor bias. But the modern reliance on silver and branded dressings is also partly fashion, and many of those products have no better trial support than vinegar.

10-line summary

1. Clean drinkable water, poured generously, does more for a fresh wound than any antiseptic.
2. Almost every antiseptic kills human cells at the strength sold, and blood and pus switch most of them off.
3. Ethanol at 60% to 80% is the best hand and skin antiseptic, kills no spores, and does not belong in wounds.

4. Hypochlorite at 0.025% (5 mL of 5% bleach per litre) is the village's best wound antiseptic, used only for infected or dirty wounds.
5. Hypochlorite at 0.5% kills spores on clean surfaces, and 1% is for blood that cannot be wiped up first.
6. Vinegar at 0.25% to 1% clears Pseudomonas, the cause of green pus, and helps little else.
7. Iodine works but harms the thyroid of newborns and the unborn, and a village cannot make it from seaweed.
8. Permanganate at 1 in 10,000 is a drying soak with weak evidence, and its crystals burn and kill when swallowed.
9. Silver helps newborn eyes where gonorrhoea is common, does not help wounds as dressings, and colloidal silver is useless and permanent in its harm.
10. Honey heals partial-thickness burns faster, is never fed to a baby under 12 months, and sugar is a fair substitute for infected wounds.

Open questions

- No trial compares 0.025% hypochlorite with plain water for infected wounds in a low-resource setting.
- Whether 0.005% (Lineaweaver) or 0.025% (Heggers) is the better compromise in living wounds is unresolved.
- The size of the Madhusudhan trial was not read, and no trial of acetic acid on acute contaminated wounds was found.
- No trial of manuka against ordinary local honey on wounds was found.
- The kelp iodine yield varies about fivefold between sources.
- How fast salvaged povidone-iodine and tincture lose strength in hot storage was not found [VERIFY].
- Whether chlorhexidine, if salvaged, should replace iodine for newborn skin care belongs to the newborn chapter.

Sources to read in full

1. Rutala et al. 2008, CDC disinfection guideline: kill data for every chemical.
2. Kramer et al. 2018, Consensus on wound antisepsis: the best case for antiseptics.
3. Babalska et al. 2021: concentrations and contraindications in one place.
4. Heggers et al. 1991 and Lineaweaver et al. 1985a and 1985b: the toxicity debate.
5. Storm-Versloot et al. 2010 and Norman et al. 2017: silver and burns.
6. Gray, ICRC War Wounds, for the field stance on antiseptics.
7. Dakin 1915 in the BMJ, from the page images.

At the bedside after the Fall

The household

Minimum viable version. Boiled water and a clean jug, salt, white vinegar, honey or sugar in a sealed jar, a bottle of known household bleach kept dark and cool, soap, and a marked 5 mL spoon. Water for every wound, dilute bleach or vinegar only for an infected one, honey on burns.

What it needs to start. A 5 mL spoon, a jug with litre marks, a label on every bottle (contents, strength, date) and a high or locked shelf.

First failure to expect. Too strong: neat bleach, neat spirit or dark permanganate poured into a wound, or bleach mixed with vinegar in a closed kitchen. Then running out of bleach.

The village of 300

Minimum viable version. One lay healer with a dilution book, 0.025% and 0.5% chlorine made daily from bleach or an electrolytic cell (HY-05), 70% spirit from the village still for hands and skin, vinegar, honey and sugar, and a locked box of salvaged povidone-iodine, chlorhexidine, permanganate tablets and silver nitrate.

What it needs to start. A still and hydrometer, a scale reading 0.1 g, chlorine test tablets while they last, opaque bottles, a few hives, and the judgment of which wounds need only water.

First failure to expect. Salvaged bleach at half strength used as if full. Then poisoning: a child drinking hand-rub spirit or an elder swallowing permanganate tablets.

The district of 3,000

Minimum viable version. A dispensary that titrates its chlorine, runs electrolytic cells on a rota, keeps batch records, holds the district's stock of iodine and silver nitrate, and teaches the wound-cleaning rule. Newborn eye prophylaxis where gonorrhoea is known in the district.

What it needs to start. Titration reagents or a method of iodometric testing (HY-05), salt and a reliable direct-current supply, a trained nurse, records. A coastal district may explore iodine from kelp as a regional trade with an outside chemist, not as a village task.

First failure to expect. The electrolytic cell's electrodes wear out (HY-05). Then over-reach: long courses of 0.125% hypochlorite or iodine on large wounds and burns, with slowed healing and, in infants, thyroid harm.

Protocols

Protocol 1. The wound-cleaning decision

Sources: WO-02, Gray n.d., Kramer et al. 2018, Heggers et al. 1991. - [ ] Wash hands with soap and water, or rub with 60% to 80% alcohol for 30 seconds until dry. - [ ] Irrigate with drinkable or boiled water until no dirt comes out, then as much again (WO-02). - [ ] Clean the surrounding skin with soap, or alcohol or iodine on intact skin only. - [ ] Remove dead tissue and foreign bodies (WO-02). - [ ] Infected, grossly dirty, green, a burn or sloughy? If none, no antiseptic. Dress it. - [ ] Infected or grossly dirty: 0.025% hypochlorite (Protocol 3). Green pus: vinegar (Protocol 4). Burn or sloughy wound: honey or sugar (Protocol 8). - [ ] Rinse with boiled water after any antiseptic. Stop once the wound is clean, red and granulating.

Protocol 2. Boiled water and saline

Sources: SickKids AboutKidsHealth 2026, Familiprix n.d. - [ ] Boil water for 15 minutes with the lid on, and let it cool covered (both sources). - [ ] For saline, dissolve ½ teaspoon of salt in 1 cup (250 mL) or 2 teaspoons in 1 litre (SickKids, Familiprix). A pinch of baking soda is optional (SickKids). - [ ] By weight, 9 g of plain salt per litre gives 0.9% (search summary). The spoon recipes run slightly stronger, roughly 1% to 1.2% [VERIFY, my arithmetic], which does no harm. - [ ] Use non-iodised salt where possible. - [ ] Keep covered, cool, and use within 24 hours (SickKids) or make it fresh each day (Familiprix). - [ ] Use it at room or body temperature.

Protocol 3. Dilute hypochlorite for infected or dirty wounds (modified Dakin's)

Sources: Giannou and Baldan 2009 and Familiprix via WO-02, Heggers et al. 1991, Keyes et al. 2023. - [ ] Use plain, unscented household bleach of known strength. If old or untested, assume half its label. - [ ] **0.025% (standard):** 5 mL of 5% bleach in 1 litre of boiled, cooled water. With 4% bleach, 5 mL in 800 mL. With 6% bleach, 5 mL in 1,200 mL (WO-02 sources). If bleach is assumed half strength, 10 mL per litre [VERIFY, my arithmetic]. - [ ] **0.125% (dispensary, short course):** 24 mL of regular bleach in about 950 mL of boiled water with ½ teaspoon of baking soda (CHOC, via WO-02). A few days at most on necrotic or heavily contaminated wounds [VERIFY, my inference]. - [ ] Rinse once or twice daily for a few minutes, then rinse with boiled water. Protect reddened surrounding skin with oil. - [ ] Make fresh daily in a covered opaque container labelled "WOUND 0.025% CHLORINE" and dated. - [ ] Never mix with vinegar, urine, acid or ammonia.

Protocol 4. Vinegar soak for Pseudomonas (green pus)

Sources: St Louis Dermatology Center n.d., Forefront Dermatology n.d., Madhusudhan 2016. - [ ] Use clear white vinegar of about 5%. Never "cleaning" vinegar or concentrate. - [ ] **Mild (about 0.16% to 0.25%):** 1 tablespoon per pint (St Louis), or 3 tablespoons per quart (Forefront), in warm boiled water. - [ ] **Trial strength (1%):** 1 part 5% vinegar to 4 parts boiled water [VERIFY, my arithmetic], as in the Madhusudhan trial. - [ ] Soak gauze, lay it on the wound for 10 to 30 minutes, twice daily or at each dressing change. - [ ] Stop if stinging lasts more than a few minutes or the wound deepens. Do not go above 3%. - [ ] Expect green pus to clear within about a week. If it does not, or redness spreads, see Red flags.

Protocol 5. Potassium permanganate soak (salvaged tablets only)

Sources: BAD n.d., DermNet and Irish children's hospital guidance (search summaries). - [ ] One 400 mg tablet in 4 litres of warm water gives 1 in 10,000. Dissolve fully. Light pink only, add water if darker. - [ ] Crystals only with a scale reading 0.1 g: 0.1 g per litre [VERIFY, my arithmetic]. Never by eye. - [ ] Soak or apply soaked gauze for 10 to 15 minutes, for weeping or infected skin and leg ulcers, not fresh wounds. - [ ] Make fresh each use. Keep tablets locked away, never in cups or jugs, labelled "POISON. NOT TO DRINK." - [ ] If swallowed: a small glass of milk or water, then urgent help (BAD n.d.).

Protocol 6. Alcohol for hands and skin

Sources: Rutala et al. 2008, WHO 2009. - [ ] Target 60% to 80% by volume, checked with a hydrometer. Below 50% is not an antiseptic. - [ ] From 95% spirit, 74 parts made up to 100 with water gives about 70% [VERIFY, my arithmetic]. - [ ] Hands: rub all surfaces 30 seconds until dry. Wash visibly dirty hands with soap first. - [ ] Never into a wound. Never the sterilising step for instruments (WO-12). - [ ] Store away from flame, locked, labelled "NOT TO DRINK".

Protocol 7. Iodine, if salvaged

Sources: Babalska et al. 2021, EPA n.d., Backer et al. 2024, CDC n.d. - [ ] Intact skin before a cut: paint 2% tincture or 10% povidone-iodine and let it dry. - [ ] Bite, puncture or gunshot wounds after irrigation: povidone-iodine diluted to 1% or less, then rinse [VERIFY, my inference from Babalska and Gray]. - [ ] Never on newborns beyond a small area, on large wounds or burns, beyond 7 days, or with silver. - [ ] Water: 5 drops of 2% tincture per litre, 10 if cloudy, wait 30 minutes. Not in pregnancy, thyroid disease or beyond a few weeks. Does not kill Cryptosporidium.

Protocol 8. Honey and sugar dressings

Sources: WO-02 Protocols 4 and 5. - [ ] Follow WO-02. Honey: under an absorbent dressing for 12 to 24 hours. Sugar: pack the cavity, change once or twice daily while wet. - [ ] Never give honey by mouth to a baby under 12 months. - [ ] Prefer sugar from a sealed bag for deep wounds with dead tissue.

Protocol 9. Chlorine for blood spills (reconciling HY-05 and WO-12)

Sources: HY-05, WO-12, NHS England 2022, CDC. - [ ] Wear gloves or plastic bags over hands. - [ ] If the blood can be wiped up: wipe up the bulk with cloth, then flood with 0.5% (1 part 5% bleach to 9 parts water) for 10 minutes, then wipe. - [ ] If it cannot be wiped first (a pool, a porous floor, a mattress) or the bleach strength is unknown: cover with 1% (1 part 5% bleach to 4 parts water) for at least 3 minutes, then wipe and finish with 0.5% [VERIFY, combining NHS and CDC practice]. - [ ] Burn or boil the cloths.

Protocol 10. Keeping antiseptics safely

Sources: NHS England 2014 and 2022, HY-05. - [ ] One shelf, high and locked. Never in food or drink containers. - [ ] Every bottle labelled with name, strength, date made and "NOT TO DRINK". - [ ] Dilute chlorine: made daily. Bleach stock: dark, cool, tested or assumed half strength. - [ ] Permanganate, iodine and silver nitrate: kept by the healer only. - [ ] Record each batch in the dilution book: what, how much, who.

Numbers to carry

1. **Wound water:** pour until no dirt comes out, then as much again, roughly 50 to 100 mL per cm of wound.
2. **Saline:** 9 g of salt per litre of boiled water.
3. **Alcohol:** 60% to 80%, 30 seconds wet, hands and skin only, no spores.
4. **Wound chlorine:** 0.025% is 5 mL of 5% bleach per litre, rinse then wash off.
5. **Surface chlorine:** 0.5% is 1 part 5% bleach to 9 parts water for 10 minutes. 1% (1 to 4) on blood that cannot be wiped up.
6. **Vinegar for green pus:** 1 part 5% vinegar to 4 parts water, twice daily, never over 3%.
7. **Permanganate:** 1 in 10,000, one 400 mg tablet in 4 litres, light pink only. About 10 g swallowed can kill.
8. **Iodine in water:** 5 drops of 2% tincture per litre, 30 minutes, weeks not months, not in pregnancy. About 2 to 4 g swallowed can kill.
9. **Honey:** never by mouth under 12 months.
10. **Antiseptics in blood and pus:** they stop working. Clean first.

References

1. Aitken J, Williams FL. 2014. A systematic review of thyroid dysfunction in preterm neonates exposed to topical iodine. Archives of Disease in Childhood Fetal and Neonatal Edition 99(1):F21-28. https://www.researchgate.net/publication/257535180_A_systematic_review_of_thyroid_dysfunction_in_preterm_neonate (search summary only)
2. AccessMedicine. n.d. Iodine. In: Poisoning and Drug Overdose. McGraw Hill. https://accessmedicine.mhmedical.com/content.aspx?sectionid=248384537&bookid=2284 (search summary only)
3. Allen KL, Molan PC, Reid GM. 1991. A survey of the antibacterial activity of some New Zealand honeys. Journal of Pharmacy and Pharmacology 43(12). https://onlinelibrary.wiley.com/doi/abs/10.1111/j.2042-7158.1991.tb03186.x (abstract via search)
4. Babalska ZŁ, Korbecka-Paczkowska M, Karpiński TM. 2021. Wound antiseptics and European guidelines for antiseptic application in wound treatment. Pharmaceuticals 14(12):1253. https://pmc.ncbi.nlm.nih.gov/articles/PMC8708894/ (first two-thirds of full text read)
5. Backer H et al. 2024. Wilderness Medical Society clinical practice guidelines on water treatment. https://stacks.cdc.gov/view/cdc/153527/cdc_153527_DS1.pdf (search summary only, author list not verified)
6. British Association of Dermatologists. n.d. Potassium permanganate solution soaks (patient information leaflet). https://www.bad.org.uk/pils/potassium-permanganate-solution-soaks
7. British Association of Dermatologists. 2022. Guidance on minimising risk of harm from potassium permanganate soaks, and national survey of dermatologists. https://cdn.bad.org.uk/uploads/2022/11/23100001/Guidance-for-safe-use-of-potassium-permanganate-soaks-amended-Nov-2022.pdf (search summary only)
8. Britannica. n.d. Ignaz Semmelweis. https://www.britannica.com/biography/Ignaz-Semmelweis (search summary only)
9. CDC. n.d. About water treatment options when hiking, camping, or traveling. https://www.cdc.gov/drinking-water/prevention/water-treatment-hiking-camping-traveling.html (search

summary only)
10. CDC. n.d. Environmental services, and OSHA standard interpretation 1992 on bleach for blood spills. https://www.cdc.gov/infection-control/hcp/environmental-control/environmental-services.html and https://www.osha.gov/laws-regs/standardinterpretations/1992-07-28-3 (search summary only)
11. Chemistry World. n.d. Boric acid (podcast). https://www.chemistryworld.com/podcasts/boric-acid-/3010907.article (search summary only)
12. Cooper RA, Molan PC, Harding KG. 1999. Antibacterial activity of honey against strains of Staphylococcus aureus from infected wounds. Journal of the Royal Society of Medicine 92:283-285. https://europepmc.org/api/getPdf?pmcid=PMC1297205 (search summary only)
13. Dakin HD. 1915. On the use of certain antiseptic substances in the treatment of infected wounds. BMJ 2(2852):318-320. https://pmc.ncbi.nlm.nih.gov/articles/PMC2303023/ (bibliographic record only, text not read)
14. Doreen et al. 2020. Fatal methanol poisoning caused by drinking adulterated locally distilled alcohol, Wakiso District, Uganda, June 2017. Journal of Environmental and Public Health. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7204301/ (search summary only)
15. EPA. n.d. Emergency disinfection of drinking water. https://www.epa.gov/ground-water-and-drinking-water/emergency-disinfection-drinking-water (search summary only)
16. Except the Kyles and Western Isles (blog). 2018. Kelp part 1: from soda ash to iodine. http://exceptthekylesandwesternisles.blogspot.com/2018/12/kelp-part-1-from-soda-ash-to-iodine.html
17. Familiprix. n.d. Disinfecting a wound with saline solution. https://www.familiprix.com/en/articles/disinfect-with-saline-solution
18. Fay AC. n.d. The preparation, testing, and use of chlorine disinfectants. Kansas State Agricultural Experiment Station. https://www.ksre.k-state.edu/historicpublications/pubs/Sc160.pdf (search summary only)
19. Forefront Dermatology. n.d. Acetic acid 0.25% soaks (vinegar-water). https://forefrontdermatology.com/PDF/Acetic_Acid_Soak_Handout.pdf (search summary only, page refused access)
20. Fox CL Jr. 1968. Silver sulfadiazine: a new topical therapy for Pseudomonas in burns. Archives of Surgery 96:184-188. Cited via Wounds UK, A history of silver. https://wounds-uk.com/wp-content/uploads/2023/02/9ec2c8776e30dab8e0f1c01e4e03c45a.pdf (search summary only)
21. Gray R. n.d. War wounds: basic surgical management. ICRC. https://www.icrc.org/sites/default/files/external/doc/en/assets/files/other/icrc_002_0570.pdf (search summary only)
22. Halstead FD, Rauf M, Moiemen NS et al. 2015. The antibacterial activity of acetic acid against biofilm-producing pathogens of relevance to burns patients. PLoS One 10(9):e0136190. https://journals.plos.org/plosone/article?id=10.1371%2Fjournal.pone.0136190 (abstract via search, author list beyond first not verified)
23. Harper D. 1974. Kelp burning in the Glens of Antrim. The Glynns 2. https://antrimhistory.net/kelp-burning-in-the-glens-of-antrim-by-douglas-harper/
24. Heggers JP, Sazy JA, Stenberg BD, Strock LL, McCauley RL, Herndon DN, Robson MC. 1991. Bactericidal and wound-healing properties of sodium hypochlorite solutions: the 1991 Lindberg Award. Journal of Burn Care and Rehabilitation 12(5):420-424. https://pubmed.ncbi.nlm.nih.gov/1752875/ (abstract via search)
25. Hilt EE et al. 2014. Urine is not sterile: use of enhanced urine culture techniques to detect resident bacterial flora in the adult female bladder. Journal of Clinical Microbiology. https://journals.asm.org/doi/10.1128/jcm.02876-13 (search summary only)
26. Hoyme UB. 1993. Clinical significance of Credé's prophylaxis in Germany at present. Infectious Diseases in Obstetrics and Gynecology 1(1):32-36. https://pmc.ncbi.nlm.nih.gov/articles/PMC2364679/
27. Isenberg SJ, Apt L, Wood M. 1995. A controlled trial of povidone-iodine as prophylaxis against ophthalmia neonatorum. New England Journal of Medicine 332:562-566.

https://www.nejm.org/doi/full/10.1056/NEJM199503023320903 (search summary only, co-authors not verified)

28. Journal of Hospital Infection. 2024. How reliable are test results from 17 laboratories on the basis of EN 1500 for a hand rub based on 80% (w/w) ethanol? https://www.journalofhospitalinfection.com/article/S0195-6701(24)00046-X/fulltext (search summary only)
29. Kapoor VS, Evans JR, Vedula SS. 2020. Interventions for preventing ophthalmia neonatorum. Cochrane Database of Systematic Reviews CD001862.pub4. https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD001862.pub4/full (search summary only)
30. Keyes M, Jamal Z, Thibodeau R. 2023. Dakin solution (sodium hypochlorite). StatPearls. https://www.ncbi.nlm.nih.gov/books/NBK507916/
31. Kramer A, Dissemond J, Kim S, Willy C, Mayer D, Papke R, Tuchmann F, Assadian O. 2018. Consensus on wound antisepsis: update 2018. Skin Pharmacology and Physiology 31(1):28-58. https://karger.com/spp/article/31/1/28/295868/Consensus-on-Wound-Antisepsis-Update-2018 (abstract and secondary summaries only, full text could not be extracted)
32. Lineaweaver W, Howard R, Soucy D et al. 1985a. Topical antimicrobial toxicity. Archives of Surgery 120(3):267-270. https://pubmed.ncbi.nlm.nih.gov/3970664/ (abstract via search)
33. Lineaweaver W et al. 1985b. Cellular and bacterial toxicities of topical antimicrobials. Plastic and Reconstructive Surgery 75:394-396. https://pubmed.ncbi.nlm.nih.gov/3975287/ (abstract via search)
34. Lundgren S, Sonesson A. 2024. Effect of potassium permanganate on staphylococcal isolates derived from the skin of patients with atopic dermatitis. Acta Dermato-Venereologica 104. https://medicaljournalssweden.se/actadv/article/view/18642 (abstract)
35. Madhusudhan VL. 2016. Efficacy of 1% acetic acid in the treatment of chronic wounds infected with Pseudomonas aeruginosa: prospective randomised controlled clinical trial. International Wound Journal 13(6):1129-1136. https://www.researchgate.net/publication/274729216 (abstract via search)
36. medRxiv. 2025. Efficacy and effectiveness of hand hygiene-related interventions (preprint meta-analysis). https://www.medrxiv.org/content/10.1101/2025.03.12.25323775v1.full.pdf (search summary only, not peer reviewed)
37. Moyer CA et al. 1965. Treatment of large human burns with 0.5 per cent silver nitrate solution. Archives of Surgery 90:812-867. https://pubmed.ncbi.nlm.nih.gov/14333527/ (search summary only, with secondary accounts of sodium loss and methaemoglobinaemia)
38. Nagoba BS, Selkar SP, Wadher BJ, Gandhi RC. 2013. Acetic acid treatment of pseudomonal wound infections: a review. Journal of Infection and Public Health 6(6):410-415. https://pubmed.ncbi.nlm.nih.gov/23999348/ (search summary only, co-authors not verified)
39. National Museum of Civil War Medicine. n.d. Gunpowder and seaweed: the story of iodine. https://www.civilwarmed.org/story-of-iodine/
40. NCCIH. n.d. Colloidal silver: what you need to know. https://www.nccih.nih.gov/health/colloidal-silver-what-you-need-to-know
41. NHS England. 2014. Patient safety alert: risk of death and serious harm from accidental ingestion of potassium permanganate preparations. https://www.england.nhs.uk/2014/12/psa-potassium/ (search summary only)
42. NHS England. 2022. Inadvertent oral administration of potassium permanganate (National Patient Safety Alert), and National infection prevention and control manual, Appendix 9: management of blood and body fluid spills. https://www.england.nhs.uk/2022/04/inadvertent-oral-administration-of-potassium-permanganate/ and https://www.england.nhs.uk/wp-content/uploads/2022/09/nipc-manual-appendix-9-blood-body-spills.pdf (search summaries only)
43. NIOSH. n.d. Immediately dangerous to life or health concentrations: iodine. https://www.cdc.gov/niosh/idlh/7553562.html (search summary only)

44. Norman G, Christie J, Liu Z et al. 2017. Antiseptics for burns. Cochrane Database of Systematic Reviews CD011821.pub2. https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD011821.pub2/abstract (search summary only, co-authors not verified)
45. Ortega-Llamas L, Quiñones-Vico MI, García-Valdivia M et al. 2022. Cytotoxicity and wound closure evaluation in skin cell lines after treatment with common antiseptics for clinical use. Cells 11(9):1395. https://pmc.ncbi.nlm.nih.gov/articles/PMC9099882/
46. Potassium permanganate poisoning case reports, including Indian Journal of Critical Care Medicine 2014 and PMC3981279. https://www.ijccm.org/doi/pdf/10.4103/0972-5229.146318 and https://pmc.ncbi.nlm.nih.gov/articles/PMC3981279 (search summaries only)
47. Povidone-iodine and neonatal thyroid: J Pediatr 1997 (PMID 9226209), cord blood TSH study (PMID 7699215), labour and breast milk study (PMID 8640469), and J Pediatr Endocrinol Metab 2017 (doi 10.1515/jpem-2017-0087). https://pubmed.ncbi.nlm.nih.gov/9226209/ (search summaries only, authors not read)
48. Rutala WA, Weber DJ, HICPAC. 2008, updated. Guideline for disinfection and sterilization in healthcare facilities: chemical disinfectants. CDC. https://www.cdc.gov/infection-control/hcp/disinfection-sterilization/chemical-disinfectants.html
49. Ryssel H, Kloeters O, Germann G et al. 2009. The antimicrobial effect of acetic acid: an alternative to common local antiseptics? Burns 35(5):695-700. https://www.sciencedirect.com/science/article/abs/pii/S0305417908003616 (abstract via search, co-authors not verified)
50. SickKids AboutKidsHealth. 2026. Saline solution: how to prepare at home. https://www.aboutkidshealth.ca/saline-solution-how-to-prepare-at-home
51. St Louis Dermatology Center. n.d. Vinegar water soaks. https://www.stlouisdermcenter.com/vinegarwatersoaks
52. Storm-Versloot MN, Vos CG, Ubbink DT, Vermeulen H. 2010. Topical silver for preventing wound infection. Cochrane Database of Systematic Reviews CD006478. https://pubmed.ncbi.nlm.nih.gov/20238345/ (abstract and plain-language summary only)
53. Turkish methanol outbreak. 2024. An outbreak of home distillation methanol poisoning in Turkey during the COVID-19 pandemic: a single center experience. https://pmc.ncbi.nlm.nih.gov/articles/PMC11097313/ (search summary only)
54. UNICEF Supply Division. n.d. Calcium hypochlorite 65-70%. https://supply.unicef.org/s0000589.html (search summary only)
55. Weisse ME, Eberly B, Person DA. 1995. Wine as a digestive aid: comparative antimicrobial effects of bismuth salicylate and red and white wine. BMJ 311:1657-1660 [VERIFY journal]. Cited via search summary only.
56. WHAM. n.d. WHAM evidence summary: potassium permanganate (Condy's crystals). Wound Practice and Research. https://journals.cambridgemedia.com.au/wcetpt/volume-44-number-3/wham-evidence-summary-potassium-permanganate-condys-crystals (search summary only)
57. WHO. 2009. WHO guidelines on hand hygiene in health care. https://apic.org/Resource_/TinyMceFileManager/Academy/ASC_101_resources/Guidelines-APIC-CDC-WHO/WHO_Hand_Hygiene_Guideline_2009.pdf (search summary only)
58. WHO. n.d. Guide to local production: WHO-recommended handrub formulations. https://www.who.int/docs/default-source/documents/guidelines/guide-to-local-production.pdf (search summary only)
59. Wikipedia. Tincture of iodine. https://en.wikipedia.org/wiki/Tincture_of_iodine
60. Wikipedia. Lugol's iodine, Bernard Courtois, Henry Bollmann Condy, Calcium hypochlorite, Pot still, Theodoric Borgognoni, Henri de Mondeville. https://en.wikipedia.org/wiki/Lugol's_iodine and related pages (search summaries only)
61. THRIVING library, WO-02. Cleaning the wound: irrigation, debridement, honey, sugar and the lessons of Ambroise Paré. Cited for Fernandez and Griffiths 2012, FLOW 2015, Jull 2015, Giannou and Baldan 2009,

CHOC, Familiprix, MHRA 2014, Simon 2009 and Subrahmanyam.

62. THRIVING library, WO-12. Sterile enough: boiling, pressure cookers, flame, alcohol, carbolic and the sterilisation ladder.
63. THRIVING library, HY-05. Making soap, lye and disinfectants from ash, fat, salt and sun. Cited for Rutala et al. 2000, Greatorex et al. 2010, Sloss et al. 1993, Iqbal et al. 2016 and the electrolytic record.
64. THRIVING library, HY-02. Safe water without a utility. Cited for Lantagne's bleach-label findings.