ME-11 Fats, waxes and oils: salves, lanolin, beeswax, tallow and plant oils for wounds and skin

HEALING after the FALL, research library, ME-11

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 covers the fatty bases a household can make or salvage, the salves made from them, the plants put into them that have been tested in people, and the harm each does. It does not repeat the general salve method, the King's 1 to 5 wax ratio or the botulism record for infused oils (THRIVING library, ME-01). It also leaves out drying (ME-04), Winter's moist-healing experiment and the ICRC wound rules (WO-02), burn first aid (WO-04), the Koll and Predel comfrey trials and the foxglove deaths (PH-01), rendering for soap (HY-05), sulfur ointment (ME-08) and honey as antiseptic (IN-07).

Two corrections to the library and the brief come out of the reading. The European limit for comfrey's pyrrolizidine alkaloids is now below 1 microgram a day, not 0.35. And the European monograph limits comfrey to 10 days of use, not 10 days a year.

Findings by section

1. What fat does on skin: occlusion, moisture and its limits

Mechanism. A fat or wax on skin or a shallow wound slows water loss, stops a dressing sticking and shuts out some dirt. It does not kill bacteria. A 2016 minireview found beeswax active against *Staphylococcus aureus*, *Candida albicans* and others in the laboratory, more so when mixed with honey or olive oil, but that is not a clinical effect (Beeswax minireview 2016). The case for keeping a shallow wound moist rests on Winter's 1962 pig experiment (THRIVING library, WO-02). A salve is a crude way of doing the same.

The trial that matters most. Smack and colleagues at Walter Reed randomised 922 patients with 1,249 wounds after skin surgery to white petrolatum or bacitracin ointment, double-blind. - **Infection:** 2.0 per cent on petrolatum against 0.9 per cent on bacitracin. The difference was not significant (95 per cent confidence interval minus 0.4 to 2.7 per cent, P equals 0.37). - **But:** eight petrolatum infections were *S. aureus* against none on bacitracin (P equals 0.004). - **Allergy:** four bacitracin patients developed allergic contact dermatitis, against none on petrolatum. - **Healing:** did not differ (Smack and others 1996).

On a clean wound a plain, inert grease does about as well as an antibiotic ointment the village will not have.

Where petroleum jelly came from. Robert Chesebrough saw well workers at Titusville, Pennsylvania, in 1859 using the "rod wax" that fouled their pumps on cuts. He refined it and patented the process in 1872, US Patent 127,568. Sources disagree whether the name Vaseline dates from 1870 or 1872 (Chesebrough histories, secondary). It cannot be made after the Fall, but jars will be salvaged for years, and it never goes rancid.

Fat on gauze before antibiotics. Auguste Lumière in Lyon devised tulle gras in 1915: wide-mesh gauze soaked in petrolatum with balsam of Peru, later given as 98 parts soft paraffin, 1 balsam and 1 olive oil (Tulle gras, secondary). It was a non-stick layer under an absorbent dressing, not a treatment. The balsam was removed in 2004 as a common allergen. Paraffin burn dressings such as Ambrine appeared in the same years (Modern Treatment of Burns 1919). After the Cocoanut Grove fire of 1942, soft petrolatum dressings replaced tannic acid crusts (THRIVING library, WO-04).

Occlusion and infection. A 1990 review pooled infection rates of 7.1 per cent in 1,085 wounds under conventional dressings and 2.6 per cent in 3,047 under occlusive ones (Occlusive dressings review 1990, authors given elsewhere as Hutchinson and McGuckin [VERIFY]). The occlusive products were films and hydrocolloids, not grease, and the wounds were mostly clean. In the same year Marshall, Mertz and Eaglstein inoculated wounds in pigs. *Pseudomonas aeruginosa* grew most under two occlusive products. *Clostridium perfringens* and *Bacteroides fragilis* fell sharply in wounds open to air and only slightly under film. They concluded that occlusion is not indicated where a wound looks grossly contaminated or may hold anaerobes (Marshall, Mertz and Eaglstein 1990).

The rule. - **A salve is right on:** a clean, shallow, washed wound, dry or cracked skin, skin around a wound needing protection from discharge or urine, and gauze as a non-stick layer. - **A salve is wrong on:** a deep, dirty, bitten, punctured or crushed wound, a wound that is red, hot, swelling, smelling or discharging, an abscess that needs opening, and a fresh burn.

The ICRC forbids vaseline gauze in deep war wounds for this reason (THRIVING library, WO-02). The romance of the healing salve for the deep wound is the most dangerous idea in this chapter, because it replaces irrigation, debridement and drainage with something that looks like care.

2. The bases

2.1 Lard and tallow Rendering. The British Pharmaceutical Codex of 1911 sets out the method. - **Before:** expose the raw fat to air for some hours to lose water. - **Rendering:** at no more than 57 degrees. - **After:** wash repeatedly with boiling water, free it of all water, and filter hot. - **Which fat:** leaf fat from around the kidneys is preferred (BPC 1911, Adeps).

Lard melts at 38 to 40 degrees. Kitchen rendering is in FEASTING after the FALL (THRIVING library, HY-05). For a salve the Codex method, low and slow, is better.

Rancidity. Lard exposed to air and moisture rapidly becomes rancid, by hydrolysis to free fatty acids and by oxidation (BPC 1911, Adeps). An Indonesian study stored rendered tallow at 25 degrees for 180 days. Peroxide value, the marker of early oxidation, passed the acceptable limit (17.3 and 16.9 milliequivalents per kilogram), though acid value stayed acceptable, and storage at 4 degrees did not fully protect it (Tallow storage study). FEASTING gives tallow a year and lard six to nine months (THRIVING library, HY-05). My reading is that good tallow in a cool dark cellar is usable for a year by smell but has begun to oxidise within six months, and that warm storage halves the time [VERIFY].

Slowing it. The pharmacopoeias treated lard with benzoin resin, from *Styrax* species. - **British Pharmacopoeia:** 3 parts benzoin to 100 lard. - **United States Pharmacopoeia:** 2 parts (BPC 1911, Adeps). - **A modern chemical index:** 1 per cent, warmed at no more than 60 degrees (Lard, drugfuture).

The Codex warns that benzoated lard is slightly irritant and unfit for the eye. Gamma and delta tocopherol at 100 to 250 ppm slowed oxidation of lard in the laboratory, while alpha tocopherol at 250 ppm made it worse (Tocopherols and lard 2011). These are laboratory doses, not household ones. The household levers are dry fat, no water, small jars filled to the top, a cool dark shelf and a closed lid.

Ghee. Clarified butter, boiled until its water has gone, is the fat of South Asian wound medicine. The ICRC pours equal parts honey and ghee or oil on gauze for burns (THRIVING library, WO-04). No shelf-life figure was found

[VERIFY].

2.2 Beeswax Beeswax melts at 62 to 65 degrees, with a flash point above 200 (Beeswax safety data sheet). Yellow wax is purified comb wax and white wax is yellow wax bleached (USP Yellow Wax). A clean block keeps for years [VERIFY, inference].

The ratio. The brief's 1 part wax to 4 to 8 of oil is right at the firm end, and I found no source for the soft end with liquid oil alone.

Formula	Wax	Fat or oil	Ratio	Source
USP simple ointment	white wax 200 g	benzoinated lard 800 g	1 to 4	US Dispensatory 1918
Same, warm climates	up to 250 g	750 g	1 to 3	US Dispensatory 1918
King's ointment	one fifth	lard	1 to 5	ME-01
Galen's cerate, 1904	2 oz	8 fl oz almond oil, 6 fl oz rose water	about 1 to 4 to the oil [VERIFY]	Cosmetics and Skin
Galen's cerate, BPC 1911	1 oz	4 fl oz almond oil, 1 oz soft paraffin, 2 fl oz rose water	about 1 to 4.5	BPC 1911
USP yellow ointment	50 g	petrolatum 950 g	1 to 19	USP
Zinc and castor oil BP	100 g	castor 500 g, arachis 305 g	about 1 to 8	BP

With liquid oils, 1 to 4 gives a firm salve, 1 to 5 a soft one, and 1 to 8 works only with a solid partner such as zinc oxide or cetostearyl alcohol [VERIFY]. Lard and tallow need far less wax, and petrolatum about 5 per cent. Test a spoonful on a cold plate before pouring (THRIVING library, ME-01).

2.3 Lanolin What it is. Lanolin is the wax from sheep's skin glands, a mixture of sterol and wax esters. Crude wool grease is usually given as about 5 to 25 per cent of freshly shorn wool, a figure I could trace only to encyclopedic sources (Lanolin, secondary). Fine wools such as Merino carry 15 to 16 per cent, and landrace breeds much less (Spin Off). Total contaminants, including suint, dirt and plant matter, are 35 to 40 per cent of greasy wool (Woolmark). The brief's 10 to 25 per cent fits fine-wooled sheep and is too high for most hill breeds.

Getting it. Home guides boil unwashed fleece in water, let it cool and lift off the waxy layer (home lanolin guides, secondary). No yield was found. The product is dark, smells of sheep and carries whatever was on the fleece.

Pesticides. Sheep dips concentrate in the grease. That is why pharmacopoeial lanolin is refined, and why the USP's modified lanolin is processed to cut free alcohols and pesticide residues (USDA lanolin review 1999, USP Modified Lanolin). Grease from a flock never dipped is probably fine for intact skin. Grease from fleece of unknown history should not go on a wound, a nipple or a baby [VERIFY, inference].

Allergy. Rates among patients referred for patch testing: - **London, 1982 to 1996:** 1.7 per cent of 24,449, rising to 6.0 per cent among those with lower-leg dermatitis (Wakelin 2001). - **North America, 1994 to 2006:** 2.5 per cent of 25,811 (Warshaw 2009). - **North America, 2001 to 2018:** 3.3 per cent of 43,691, and 4.5 per cent in children (Silverberg 2022).

The rate in the whole population is lower, since these are referred patients. The pattern matters more than the number. Lanolin seldom sensitises healthy skin but does sensitise broken skin, so allergy concentrates in leg ulcers and eczema, the people a healer will be tempted to treat with it.

Nipples. Lanolin is sold as the treatment for sore nipples. The Cochrane review by Dennis and colleagues found four trials with 656 women and insufficient evidence for any treatment. Nothing, or expressed breast milk, may be as good as lanolin or better. Pain fell to mild by seven to ten days after birth whatever was used (Dennis and others 2014). The review's lead author supervised a lanolin trialist, which it declares. Sore nipples are a latch problem first, and the remedy at hand is breast milk.

2.4 Plant oils **Olive oil** (*Olea europaea*, fruit). Danby and colleagues had 19 adults apply olive oil to one forearm and sunflower oil to the other. Olive oil reduced the integrity of the outer skin layer and caused mild redness, while sunflower oil preserved integrity and improved hydration. The authors advised against olive oil for dry skin and infant massage (Danby and others 2013). Its high oleic acid is the suspected cause. Olive oil remains a good solvent for an infused oil, but it is the wrong leave-on emollient for babies and eczema.

Sunflower oil (*Helianthus annuus*, seed). In Dhaka, infants born before 33 weeks were massaged daily with sunflower oil (159), Aquaphor (157) or nothing (181). Sunflower oil cut hospital-acquired infection by 41 per cent, adjusted incidence rate ratio 0.59 (0.37 to 0.96) (Darmstadt and others 2005). A 26 per cent mortality reduction appears in a later cost-effectiveness paper (LeFevre and others 2010), and I could not trace it to the trial abstract [VERIFY].

The Cochrane review pooled 15 trials of plant oils in 3,492 preterm infants: - **Invasive infection:** risk ratio 0.71 (0.52 to 0.96), low certainty, high heterogeneity. - **Mortality:** risk ratio 0.94 (0.82 to 1.08), little or no effect. - **Petroleum ointments and creams:** no effect on infection, risk ratio 1.13 (0.97 to 1.31) (Cleminson and McGuire 2021).

In term babies, Cooke and colleagues randomised 115 newborns to olive oil, sunflower oil or no oil, and both oils slowed barrier development compared with nothing (Cooke and others 2016). The reading is sunflower oil for the premature baby, and nothing for the healthy term baby.

Mustard oil (*Brassica juncea*, seed). This is the traditional newborn oil across much of South Asia. In mice it raised water loss and damaged skin cells, while sunflower oil helped, and a trial in Sarlahi, Nepal, of 995 newborns found little difference between the two oils on the skin measures tested (Nepal oil trial). Mustard oil adulterated with seed of *Argemone mexicana*, Mexican prickly poppy, causes epidemic dropsy when eaten (Indian Pediatrics 2003).

Coconut oil (*Cocos nucifera*, kernel). In Manila, 117 children with mild to moderate atopic dermatitis used virgin coconut oil or mineral oil. Severity scores fell 68 per cent on coconut against 38 per cent on mineral oil (Evangelista and others 2014). It is one small trial. Coconut oil is mostly saturated and keeps longer than seed oils [VERIFY, inference].

Sesame oil (*Sesamum indicum*, seed). Sesame is the base of Ayurvedic *taila* and of the Chinese Moist Exposed Burn Ointment (MEBO). - **Systematic review:** six randomised trials, two of three against silver sulfadiazine favouring MEBO (Mabvuure and others 2021). - **Singapore:** a trial of 115 found it equal to silver sulfadiazine on facial burns (Ang and others, via IJDVL). - **Greece:** a trial of 211 found it cost-effective (Greek MEBO trial 2011).

MEBO also contains beta-sitosterol and berberine, so none of this speaks for plain sesame oil.

Castor oil (*Ricinus communis*, seed). The oil is a laxative and the classic base for zinc ointment. Ricin, a protein, stays in the seed and press cake and does not pass into pressed oil (Worbs and others 2011). The seed is the danger. A review covering 1738 to 1988 counted 314 poisonings with 15 deaths (DTIC castor review). Seeds must be chewed to release the toxin, symptoms are delayed 3 to 20 hours, and there is no antidote. A household should not press castor at home without a press and somewhere safe to bury the cake [VERIFY, inference].

Linseed oil (*Linum usitatissimum*, seed). Linseed is a drying oil that goes rancid in weeks, so it is a poor salve base. Worse, cloths soaked in it heat themselves and can ignite within hours when bunched, and other seed and fish oils can do the same (Fire and Emergency New Zealand, British Coatings Federation). Put oily straining cloths into water in a closed tin, or spread them flat outdoors.

Shea butter (*Vitellaria paradoxa*, kernel). Women across the West African savanna make shea butter by cracking, roasting, grinding, kneading and boiling the kernels, and the knowledge and income are theirs (Shea production 2011, Practical Action). It goes on burns, rashes, ulcers, scabies and newborns. A dermatology review notes a dearth of clinical research (MDedge shea review).

2.5 Petroleum jelly Salvaged petrolatum is the best base the village will own. It does not go rancid, rarely causes allergy and has the one good trial (Smack and others 1996). Its harm is in the airway. Bedtime use inside the nose has caused lipoid pneumonia, oil in the lung, and the treatment is to stop (Lipoid pneumonia 1994, Mayo Clinic). Mineral oil given by mouth to children has caused the same, in series of up to 28 children (paediatric lipoid pneumonia, secondary). No petroleum product or oil goes inside a baby's nose, and no mineral oil goes into a small child's mouth.

2.6 The base-material table

Base	Source	Keeps (cool, dark, closed)	Spoiled by	Use	Main harm
Tallow	Make	6 to 12 months [VERIFY]	Water, air, warmth, light	Firm salves	Rancid fat irritates
Lard	Make	6 to 9 months	Same, faster	Soft ointments, sulfur ointment	Same
Benzoated lard	Make, if benzoin held	Longer, no figure	Same	Old base	Irritant, not for eyes
Ghee	Make	No figure [VERIFY]	Water, milk solids	Ghrita, honey-ghee dressing	Rancidity
Beeswax	Apiary	Years [VERIFY]	Dirt	Stiffener	Fire if overheated
Lanolin, crude	Undipped fleece	No figure [VERIFY]	Pesticides, dirt	Intact dry skin	Allergy on broken skin
Olive oil	Trade	Not verified	Light, warmth	Infusion solvent	Barrier damage as leave-on
Sunflower oil	Press	Shorter than olive [VERIFY]	Light, warmth	Preterm skin, salves	Rancid quickly
Coconut oil	Trade	Long [VERIFY]	Water	Eczema, salves	Few
Castor oil	Press with care	Long [VERIFY]	Water	Zinc ointment	Seed and cake kill
Linseed oil	Press	Weeks	Air	Not a salve base	Oily rags ignite
Petrolatum	Salvage	Indefinite	Water, fingers	Wound ointment, base	Lipoid pneumonia in nose
Wax salve, dry herb	Make	6 to 18 months (ME-01)	Water, rancid oil	Shelf salves	Wrong plant, rancidity

Base	Source	Keeps (cool, dark, closed)	Spoiled by	Use	Main harm
Infused oil with water	Make	Days	Water, warmth	Never stored	Botulism (ME-01)
Cold cream	Make	Days to weeks [VERIFY]	Microbes	Cooling cream	Contamination

3. Making the preparations

3.1 Infused oils The library gives two warm-infusion figures: 40 to 60 degrees for 2 to 4 hours (ME-01), and 60 to 70 for 2 to 3 hours (PH-01). The EMA names ratios, not method. - **Calendula:** an oil extract at 1 part herb to 10 of vegetable oil, used at 2 to 8 per cent herb equivalent (EMA calendula 2018). - **St John's wort:** 1 to 4 up to 1 to 20 in vegetable oil, applied undiluted (EMA hypericum 2021).

The one experiment I found is Serbian. The most carotene from calendula (57.5 mg per kilogram) came from 72 hours' maceration in olive oil at room temperature at 1 to 5, not from heating to 70 degrees (Novković and others 2005, abstract). Home guides give gentle heat for hours, or sun for weeks (Mountain Rose Herbs). In Kosovo, St John's wort flowering tops sit in oil in the sun for 40 days until the oil turns deep red (Lyles and others 2017).

My reading is 40 to 60 degrees for 2 to 4 hours, or room temperature for 3 days to 2 weeks, with dried herb at 1 to 5 or 1 to 10, never above 70. I side with ME-01's lower range, since nothing shows that more heat helps and hot oil oxidises faster.

Water is what kills, and ME-01 sets out the rules (THRIVING library, ME-01). The traditional sun-macerated St John's wort oil is made with fresh flowers, so it is the infused oil most likely to grow *Clostridium botulinum*. Wilt the flowers first, decant off any watery layer, and use the oil on skin only [VERIFY, inference].

3.2 The tradition's own water test Ayurvedic pharmacy solves the water problem in its own way. Medicated ghee (*ghrita*) and oil (*taila*) are made by *sneha paka*: 1 part herb paste, 4 parts fat and 16 parts liquid (decoction, milk or juice), cooked until the water has gone. The end point is judged by the senses (GRAYU, Jatyadi Ghrta): - The paste rolled between the fingers forms a wick. - It burns without crackling in a flame. - The froth subsides.

The crackle is water boiling, so when it stops the water is gone. Any household can use this test: cook a medicated fat until it stops crackling and foaming, and only then strain it. In a 2023 trial of 45 patients, Jatyadi tulle, honey-ghee tulle and honey tulle healed wounds comparably (Jatyadi tulle trial 2023).

3.3 Cold cream, and why salves fail Galen's cerate, the *ceratum refrigerans*, was wax, oil and rose water beaten together as they cooled. The cooling comes from water evaporating on the skin. By 1911 the Codex had added borax to hold the emulsion (BPC 1911, Ceratum Galeni). Leave the borax out. Any cream with water in it grows microbes, so make it small, from boiled water, keep it cold, and discard it at any change or after two weeks [VERIFY].

The common failure of a dry salve is rancidity, not infection. A rancid salve smells sharp, stale or like old paint and irritates skin. Mould appears only where water got in.

4. Fat on wounds in the healing traditions

Egypt. The surgical papyri describe lint, grease and honey on linen laid over the wound. Guido Majno counted honey in about 500 of 900 Egyptian remedies (Majno 1975, via Egyptian wound care history). In their own understanding the grease and honey covered and closed the wound. Modern reading gives the lint the role of absorbent, the grease of barrier and the honey of antibacterial agent. This is close to the ICRC's honey and ghee today.

South Asia. In Ayurveda the fat, *sneha*, carries the medicine into the tissue, taking on the herb's qualities in cooking, and itself soothes and nourishes. Ghee goes on wounds and burns, and oil on the body and the newborn. Daily newborn oil massage is near universal, with mustard oil in the north and coconut or sesame in the south, as protection, warmth and strength. Attached evidence: sunflower oil protects the premature, mustard oil damages the barrier in mice, and in term babies any oil may slow barrier development.

China. MEBO grew from Xu Rongxiang's burn practice on the principle that a burn heals best moist and exposed under an oil [VERIFY, history not read]. Its trials show it at least equal to silver sulfadiazine.

The Balkans. Kosovars make the red oil of St John's wort each summer for wounds, ulcers, burns and skin infections. Four Kosovar oils contained hyperforin but no detectable hypericin. They barely inhibited *S. aureus* growth but blocked biofilm formation at very low concentrations (Lyles and others 2017). The authors suggest the oil may blunt staphylococcal virulence rather than kill. Nothing shows faster healing in people.

West Africa. Shea butter is a woman's craft and medicine, with almost no evidence attached.

Northern Europe. Goose grease, lard and mutton tallow went on chapped hands, udders and chests across the continent. I found no study of any of them [VERIFY].

The traditions agree that fat covers, softens and protects, and that medicine travels into skin in fat. Science confirms the first, and transfer through skin is modest. No tradition read treats fat as the cure for a deep or infected wound. In each, the fat goes on after cleaning, or around the wound.

5. The plants with trials

5.1 Comfrey, *Symphytum officinale*, root and leaf **Tradition.** Knitbone and boneset name its use: sprains, bruises, fractures and wounds, poulticed, salved and drunk.

Record. Comfrey has the best trials of any salve plant (Koll and Predel in PH-01). - **Knee osteoarthritis (Grube and others 2007):** 220 patients in Berlin used 2 g of root extract ointment or placebo three times daily for three weeks. Pain fell 54.7 per cent against 10.7 per cent, a difference of 41.5 mm on a 100 mm scale (34.8 to 48.2). - **Back pain (Kucera and others 2005):** 10 per cent herb cream (104 patients) against a 1 per cent reference (111), with a number needed to treat of 3.2. - **Fresh abrasions in adults (Barna 2007):** 278 people, full healing in 4.08 against 7.05 days. - **Fresh abrasions in children (Barna 2012):** 108 children, with half-healing 0.9 days faster.

Almost every trial used one manufacturer's products. The 1 per cent comparators make the Kucera and Barna trials weaker than placebo trials.

The abrasion trials do not license garden comfrey on broken skin. They used a cultivated hybrid, *Symphytum* × *uplandicum* herb, prepared free of detectable pyrrolizidine alkaloids (Barna 2012, Schmidt 2022). A household's comfrey has not been tested.

The regulator. The EMA monograph, corrected in January 2024, grants only traditional use, for minor sprains and bruises (EMA comfrey 2024). - **Preparation:** a 65 per cent ethanol liquid extract concentrated 2 to 1, at 10 per cent in a semi-solid base, applied thinly twice a day. - **Duration:** not more than 10 days. - **Not for:** broken or irritated skin, eyes or mucosa, people under 18, pregnancy or breastfeeding. - **Alkaloid cap:** pyrrolizidines below 1 microgram a day in adults.

This corrects two figures. The 0.35 microgram limit in ME-01 and PH-01 is the older one, raised in the 2024 correction. The brief's "10 days a year" is not in the monograph, which gives no annual cap. The German Commission E's four to six weeks a year may be its source [VERIFY].

Absorption. - **Rats:** 0.1 to 0.4 per cent of applied alkaloids appeared in urine (Brauchli and others 1982, secondary). - **Human epidermis in glass cells:** 0.04 to 0.22 per cent of lycopsamine passed through in 24 hours (Jedlinszki and

others 2017). - **Two further studies:** a 2020 paper and a 2021 industry-funded study also found low penetration (Kuchta and Schmidt 2020, comfrey skin study 2021).

The monograph calls the data rudimentary. Intact skin lets through well under 1 per cent. Broken skin was never tested.

Grades. A for sprain, knee and back pain with a standardised extract ointment. C for a home root salve on intact skin. X for ordinary comfrey on broken skin. X by mouth. Foxglove is the lookalike that has killed comfrey tea drinkers (THRIVING library, PH-01).

5.2 Calendula, *Calendula officinalis*, flower **Tradition.** Pot marigold is the European cottage flower for wounds and skin.

Record. The two key trials disagree. - **Lyon (Pommier and others 2004):** 254 women having radiotherapy after breast surgery, 1999 to 2001, used calendula ointment or trolamine. Grade 2 or worse dermatitis occurred in 41 against 63 per cent (P below 0.001), with less pain. Four trolamine patients had allergic reactions. Calendula was harder to apply. - **Karolinska (Sharp and others 2013):** a blinded trial against plain aqueous cream found 23 against 19 per cent, no difference.

Pommier's comparator may have been worse than nothing. Calendula prevents radiation dermatitis about as well as a plain emollient, and no trial read tests it on a wound.

The regulator. Traditional use for minor skin inflammation such as sunburn and as an aid to healing minor wounds (EMA calendula 2018). - **Infusion:** 1 to 2 g in 150 ml for compresses, 2 to 4 times daily. - **Semi-solids:** 2 to 10 per cent herb. A 1 to 10 oil extract is used at 2 to 8 per cent herb, and a 1 to 5 to 1 to 25 extract in fat or petrolatum at 4 to 20 per cent. - **Not for:** children under 6, or anyone with daisy-family (Asteraceae) allergy. Sensitisation has been reported.

A 1 to 10 oil stiffened 1 to 4 with wax gives about 8 per cent herb, inside the range [my arithmetic].

Identification. French and African marigolds, *Tagetes*, are often called marigold and have been confused with calendula in trade (SCU herbal authentication). *Tagetes* smells rank and has finely divided leaves. Calendula smells resinous and has sticky stems and simple, slightly hairy leaves [VERIFY].

Grades. B for radiation dermatitis. C for minor wounds and sunburn.

5.3 Plantain, *Plantago major* and *P. lanceolata*, leaf The negative animal review is in WO-02. One Iranian study of 15 burns patients compared 10 per cent plantain ointment with 1 per cent silver sulfadiazine and found healing in 11.73 against 13 days (P equals 0.166) (Plantago burn study 2022). It is too small to show anything. Plantain is a soothing, mucilaginous leaf with no recorded harm. Grade D. A foxglove rosette is the lookalike: its leaves are soft and downy with netted veins, where plantain has strong parallel strings (THRIVING library, WO-02).

5.4 St John's wort oil, *Hypericum perforatum*, flowering tops **Tradition.** The red oil is the Balkan and Central European remedy for burns, wounds, bruises and nerve pain.

Record. In 120 women after episiotomy at Arak, a hypericum ointment matched placebo at day 5 and beat it at day 10 (Arak episiotomy trial). The EMA grants traditional skin use for minor inflammation and minor wounds, with the oil applied undiluted. Not under 12, and see a healer after a week (EMA hypericum 2021).

Photosensitivity. Hypericin is phototoxic. The monograph's sunburn warning for fair skin is written for oral use. In 16 volunteers, neither an oil (110 micrograms per millilitre hypericin) nor an ointment (30) changed the ultraviolet dose that reddened skin (topical hypericum phototoxicity study, secondary). The Kosovar oils had no measurable

hypericin. Topical risk looks small, but fair-skinned people should keep oiled skin out of strong sun that day [VERIFY]. The dangerous drug interactions, with contraceptives, warfarin, ciclosporin and antiretrovirals, come from swallowed extract (THRIVING library, PH-01).

Identification. *H. perforatum* leaves show translucent dots against the light, and crushed flowers stain fingers red [VERIFY].

Grades. D for wounds and burns. C for minor skin inflammation.

5.5 Arnica, *Arnica montana*, flower **Tradition.** Arnica is the Alpine and Carpathian remedy for bruises, sprains and aching muscles, rubbed on after a fall.

Record. Widrig and colleagues randomised 204 patients with hand osteoarthritis to arnica tincture gel or 5 per cent ibuprofen gel for 21 days, and found no difference (Widrig and others 2007). The Cochrane review rated this as moderate evidence of similar effect, mean pain difference minus 3.8 points on 100 (minus 10.1 to 2.5) (Cochrane topical herbal therapies). There was no placebo arm and the maker funded the trial. Ernst's and Brito's reviews found low-strength arnica no better than placebo for bruising (THRIVING library, PH-01).

The regulator. Traditional use for bruises, sprains and local muscle pain (EMA arnica 2014). - **Preparations:** ethanol tinctures at 1 to 5, 1 to 10 or 1 to 20, used at 20 to 25 per cent in a base, or a 50 per cent liquid extract. - **Use:** apply 2 to 4 times daily, or as 2.5 ml compresses. - **Not for:** broken skin, children under 12, pregnancy, or daisy-family allergy. See a healer after 3 to 4 days.

Only alcohol extracts were tested. No arnica oil was.

By mouth. Helenalin is the toxin, and the FDA lists arnica as unsafe. In 1883 a Virginia physician reported poisoning from one ounce of tincture: collapse, delirium, burning gut pain and diarrhoea, with recovery by day 3 (Thom 1883, secondary). A Colombian case of toxic hepatitis followed arnica drunk as tea (secondary). Homeopathic arnica carries neither the risk nor the effect.

Identification. Arnica is protected in much of Europe. Leopard's banes (*Doronicum*) and fleabanes (*Inula*) grow in the same meadows [VERIFY].

Grades. B for hand osteoarthritis as a standardised gel. D for bruises. X by mouth and on broken skin.

5.6 Honey, zinc, sulfur and essential oils **Honey in fat.** Honey alone runs and sticks. Fat alone does nothing to bacteria. The Egyptian lint, grease and honey, the Ayurvedic honey-ghee tulle and the ICRC's honey and ghee are one idea from three eras (THRIVING library, IN-07, WO-04). No honey for babies under 12 months, even on the skin (THRIVING library, ME-01).

Zinc oxide. Zinc oxide ointment BP is 15 per cent zinc oxide in simple ointment (150 g in 850 g). Zinc and castor oil ointment BP is 7.5 per cent zinc oxide in castor oil, arachis oil, white beeswax and cetostearyl alcohol, used for nappy rash (BP formula and SmPC). The arachis (peanut) oil rules it out in peanut allergy, and sunflower oil avoids the problem. Zinc is salvage only. Sulfur ointment, 1 in 20 of lard or petrolatum, is in ME-08.

Essential oils are added to salves and are the most toxic thing on the shelf by volume. The New South Wales Poisons Information Centre logged 4,412 exposures from 2014 to 2018. - **Who:** 63 per cent were children under 15. - **Which oil:** eucalyptus in 46 per cent, tea tree in 17. - **Dose:** as little as 5 ml can cause severe toxicity (Cairns and others 2020).

Tea tree oil oxidises once opened into strong sensitisers. Of 2,320 people patch-tested in Victoria, 41 reacted, 1.8 per cent, and a fifth of those had applied it neat (tea tree allergy 2007, oxidation study 1999). No essential oil goes in a child's salve, none by mouth, none neat on skin, and none within a child's reach. I found no tested safe dilution for a salve, and give none.

6. Burns and fat

WO-04 settles first aid: twenty minutes of cool running water and nothing else that day (THRIVING library, WO-04). After the first day, petrolatum or honey with ghee on gauze is a fair non-stick layer, as at Cocoanut Grove. MEBO's trials show an oily ointment on a partial-thickness burn is not worse than silver sulfadiazine. None of this rescues buttering a fresh burn.

Evidence grades

Remedy or use	Record	Grade
Petrolatum on a clean wound	Equal to bacitracin, 922 patients, less allergy	A
Occlusive salve on a dirty or infected wound	Anaerobes favoured in pigs, ICRC bars vaseline gauze	X
Oil or butter on a fresh burn	Condemned by burn societies, no trial	X
Petrolatum or tulle gras as a burn layer after day 1	Cocoanut Grove 1942, ICRC	B
Sunflower oil on preterm babies	Infection RR 0.71 in 15 trials, no mortality effect	A, low certainty
Olive oil as a leave-on emollient	Barrier damage in adults, slower barrier in newborns	X for infants and eczema
Mustard oil on newborns	Barrier damage in mice, adulteration	X
Coconut oil, childhood eczema	One trial of 117	B
Lanolin on sore nipples	No better than breast milk or nothing	X as proven remedy
Lanolin on intact dry skin	Long use, 1.7 to 3.3 per cent allergy in clinics	C
Beeswax 1 to 4 or 1 to 5	Pharmacopoeias	B for the ratio
Comfrey extract ointment, sprain, knee, back	Four industry-run trials	A
Comfrey home salve, intact skin	Untested preparation	C
Comfrey on broken skin, ordinary plant	Only a PA-free cultivar tested	X
Comfrey by mouth	Liver veno-occlusive disease	X
Calendula, radiation dermatitis	Beat trolamine, equalled aqueous cream	B
Calendula, minor wounds and sunburn	Traditional only	C
Plantain on wounds	Animal studies, one trial of 15	D
St John's wort oil, wounds and burns	Small trials, anti-biofilm in vitro	D
St John's wort oil, minor inflammation	Traditional use	C
Arnica gel, hand osteoarthritis	Equal to ibuprofen gel, no placebo	B
Arnica, bruises	Reviews negative	D
Arnica by mouth	Poisoning reports	X
Honey with ghee or oil on gauze	ICRC practice, honey trials	B

Remedy or use	Record	Grade
Jatyadi ghrita	One trial of 45	C
MEBO on partial burns	Six trials, at least equal to silver sulfadiazine	B
Zinc oxide 15 per cent, nappy rash	Pharmacopoeial, no trial read	C
Essential oils neat or by mouth	Poisonings, allergy	X

Means ledger

Rung	What it can do	What it changes
Hands and knowledge	Wash first. Leave deep or infected wounds open and draining. No grease on a fresh burn. Breast milk on sore nipples	Prevents the worst harm, occluding a wound that must drain
Hearth	Render fat at low heat and store it small and cool. Plain fat on cracked skin. Honey and fat on gauze. Seed oil for a premature baby	Barrier and non-stick layer for grazes, chapped skin, nappy area
Garden and still	Beeswax, dried calendula and comfrey, oil infused at 40 to 60 degrees, scales for 1 to 4 and 1 to 10, labelled jars, ethanol for arnica tincture	Repeatable salves that keep a year. Comfrey for sprains within limits
Village dispensary (300)	Salvaged petrolatum and zinc oxide, sulfur ointment, a batch register, a healer who spots infection under a salve	Petrolatum on clean wounds. Zinc and sulfur for nappy rash and scabies
District infirmary (3,000)	Someone who drains and debrides, tulle gras on boiled gauze, honey burn dressings, patch testing	Infected wounds get drainage instead of grease. Burns get a closed dressing
Hospital before the Fall	Antibiotic and silver dressings, films, standardised extracts	Little better than petrolatum on clean wounds. Far better on infected and burned skin, through drainage, antibiotics and grafts, not ointment

Harm test

How a salve kills or maims. - **Occlusion:** sealing an abscess, bite, puncture, crushed or dirty wound in grease, where anaerobes flourish (Marshall, Mertz and Eaglstein 1990). - **Botulism:** from an infused oil carrying water (THRIVING library, ME-01). - **Poisoning:** from comfrey or arnica swallowed, or an essential oil drunk by a child. - **Fire:** from oily rags, or wax heated over a flame. - **Delay:** when a salve makes a spreading infection look cared for.

Harmful doses and errors. - Any comfrey by mouth. - Comfrey on broken skin, for more than 10 days, under 18, or in pregnancy. - Arnica on broken skin, or one ounce of tincture by mouth (Thom 1883). - 5 ml of essential oil swallowed by a child, or tea tree oil applied neat. - Grease on a burn in its first hours. - Daily mustard or olive oil on a newborn. - Infusion above 70 degrees.

Who must never receive them. - **Infants:** no honey under 12 months, no essential oil, comfrey or arnica, no calendula under 6, nothing oily in the nose, no mustard oil. - **Pregnancy and breastfeeding:** no comfrey, arnica or St John's wort. - **Daisy-family allergy** (including reactions to chamomile or ragweed): no calendula or arnica. - **Peanut allergy:** no arachis oil. - **Leg ulcers and eczema:** lanolin and balsam of Peru are the likeliest allergens. - **Anyone taking salvaged contraceptives, anticoagulants or antiretrovirals:** no St John's wort by mouth.

Misidentification and contamination. - **Lookalikes:** foxglove for comfrey or plantain, leopard's bane for arnica, *Tagetes* for calendula, other *Hypericum* species for St John's wort. - **Contamination:** pesticide-laden wool grease, castor cake in the house, *Argemone* in mustard oil, mould from a wet jar.

Signs it is going wrong. - **Under a salve:** spreading redness, heat, swelling, throbbing pain, pus, smell, red streaks or fever. Take the salve off, wash, drain, and go to WO-02 and IN-07. - **From the salve itself:** an itchy, weeping rash where it went on means allergy. Stop it and never reuse that base or plant. - **From comfrey:** yellow eyes, a tender swollen liver, fluid in the belly. - **From an essential oil:** a drowsy, unsteady or fitting child. - **Botulism:** double vision, drooping lids and trouble swallowing in a clear-headed person without fever (THRIVING library, ME-01).

Historical cases. - Vancouver 1985: garlic-in-oil botulism (ME-01). - Washington 1977 and Taiwan 2010: foxglove drunk as comfrey (PH-01). - Virginia 1883: arnica tincture. - Before 1942: tannic acid crusts on burns (WO-04). - Philadelphia 1991: a high-rise fire that killed three firefighters, blamed on linseed-soaked rags (fire guidance, secondary).

Red flags

These mean a salve is the wrong answer and life or limb is at risk: - **Red, hot, swelling after the first day, or red streaks towards the trunk.** Cellulitis or lymphangitis. Remove grease, wash, drain any pus, raise the limb, and give salvaged antibiotics if any exist (THRIVING library, WO-02, IN-07). - **Crackling under the skin, grey or bronze skin, thin brown discharge, pain out of proportion.** Gas gangrene. Only wide excision or amputation saves life. Open the wound and remove all dressings and grease. If no one can operate, give pain relief and say honestly that it may be fatal. - **A burn bigger than the patient's palm on a child, or on the face, hands, feet, genitals or a joint, or with a hoarse voice.** This needs fluids and a closed dressing, not ointment (THRIVING library, WO-04). - **Yellow eyes and a swelling belly after comfrey by mouth.** Stop it, and find everyone else who drank it. - **A drowsy, unsteady or fitting child after swallowing shelf oil.** Lay them on their side, keep the airway clear, give nothing by mouth, and stay with them. - **Double vision and trouble swallowing after home-preserved oil or food.** Botulism. Nurse with the airway protected (THRIVING library, ME-01). - **A blistering rash spreading beyond the salve, with fever or mouth sores.** Not salve allergy. Stop every remedy and nurse with fluids.

Honest comfort: most skin heals by itself if kept clean and not made worse. The healer's job with a salve is mainly to do no harm, and to know when a wound has gone beyond what grease can help.

The case against

Against the herbal salve. Edzard Ernst, with Pittler and others, found arnica no better than placebo, and concluded more widely that most herbal claims have never been well tested (THRIVING library, PH-01). Calendula's best trial failed to replicate against a plain cream (Sharp and others 2013). The comfrey trials were almost all run on one maker's products, the arnica trial was maker-funded, and the Kucera and Barna trials used a 1 per cent version of the same cream as control. Plantain has no human support worth the name. A sceptic would say the active ingredient in every good salve trial is the base, and that petrolatum or rendered lard would do as well for most uses. For clean wounds and dry skin, on the evidence read, the sceptic is right.

Against the hospital view. Comfrey extracts relieve sprain, knee and back pain about as well as diclofenac, which the village will not have. Gary Darmstadt's group showed that the cheapest oil protects premature babies from infection, where hospital ointments did not. A village cannot dismiss what worked because a company ran the trial.

Against the regulator. Jedlinszki's group, and Kuchta and Schmidt, argue that human skin data do not justify the restrictions on external comfrey (Jedlinszki and others 2017, Kuchta and Schmidt 2020). The EMA admits its dermal data are rudimentary. On the other side, every penetration study used intact epidermis, and none tested broken skin.

Against lanolin. Sold as the evidence-based nipple cream, it did no better than breast milk in the Cochrane review, and the patients most often treated with it are those most likely to become allergic.

Against moist healing everywhere. Winter's principle came from shallow clean wounds in pigs. The ICRC's bulky dry dressings over deep open wounds are the counterweight, and in a village the deep dirty wound is common.

10-line summary of robust findings

1. On a clean wound, petrolatum equalled bacitracin in 922 patients, with no allergy.
2. A salve is wrong on a deep, dirty, infected or draining wound, and on a fresh burn.
3. Rendered fat keeps months, not years: lard 6 to 9 months, tallow about a year. Water, warmth, air and light spoil it.
4. Beeswax at 1 part to 4 or 5 of oil is the standard salve, 1 to 3 in heat, and it keeps 6 to 18 months if dry.
5. Sunflower oil cut infection in premature babies (RR 0.71), while olive and mustard oils weaken the skin barrier.
6. Lanolin allergy is 1.7 to 3.3 per cent in patch clinics, highest in leg ulcers and children, and lanolin is no better than breast milk for sore nipples.
7. Comfrey extract ointments beat placebo for sprains, knees and backs. The EMA allows 10 days on intact skin, under 1 microgram of pyrrolizidine a day, never by mouth.
8. Calendula beat trolamine for radiation dermatitis but not plain cream. Its wound use is traditional only.
9. Arnica gel equalled ibuprofen gel for hand arthritis. It is poisonous by mouth and for intact skin only.
10. Infused oil with water in it, essential oil in a child's hand, and oily rags are the three ways this chapter kills.

Open questions

- How much pyrrolizidine does a home comfrey salve deliver, and does it cross broken skin?
- Does a home calendula salve do anything on a wound that its base does not?
- How many months does a home tallow and wax salve keep in a cellar before it oxidises past use?
- What lanolin does hill-breed fleece yield by boiling?
- Is topical St John's wort oil phototoxic on broken skin in strong sun?
- Does sunflower oil reduce deaths in premature babies with no hospital at all?
- Not read: Hirt and M'Pia, *Natural Medicine in the Tropics* (inaccessible), and the British Pharmaceutical Codex 1934 (not found online). The 1911 Codex and the 1918 US Dispensatory were used instead.

Sources to read in full

1. Smack and others 1996, JAMA. The trial the household's plain ointment rests on.
2. EMA monographs on comfrey (2024), calendula (2018), arnica (2014) and St John's wort (2021). The only regulator-examined doses.
3. Pommier 2004 and Sharp 2013, read together.
4. Grube 2007, the best-designed comfrey trial.
5. Cleminson and McGuire 2021 and Darmstadt 2005, on oils for preterm infants.
6. Dennis 2014, Cochrane, on sore nipples.
7. Marshall, Mertz and Eaglstein 1990, on what grows under occlusion.
8. British Pharmaceutical Codex 1911 on lard and Galen's cerate.
9. Lyles 2017, on St John's wort oil as Kosovars make it.
10. Danby 2013, on olive oil and the skin barrier.

At the bedside after the Fall

The household. Keep three jars, and know when to leave them on the shelf. - **Plain ointment:** wax and rendered fat, or petrolatum while it lasts. For washed grazes, cracked skin, lips, the nappy area, and as the non-stick layer on a dressing. - **Calendula salve:** for sunburn, inflamed skin and small clean wounds. - **Comfrey root salve:** labelled external only, for sprains and bruises on unbroken skin, ten days at most, never on a child.

What it needs: a year's fat from one animal, about a kilogram of beeswax, a bed of calendula, one fenced comfrey plant, a double pan, a thermometer if possible, small jars and a cold dark shelf.

The rule on the wall: wash first, salve second. Never grease a fresh burn or a deep wound. No comfrey or arnica in the mouth. No essential oil near a child.

The first failure to expect is a family re-greasing a hot, swelling bite instead of opening it.

The village of 300. Add a dispensary shelf with: - salvaged petrolatum and zinc oxide - 5 per cent sulfur ointment for scabies - honey and ghee for burns - a batch register naming base, plant, ratio, date and maker.

Make salves twice a year in small batches. Offer warm seed oil, thinly, for premature babies, and nothing for healthy term babies. One person keeps bees, since wax limits supply. The first failure to expect is rancid stock used because it is there, with the resulting rash blamed on the plant.

The district of 3,000. Add someone who drains abscesses and debrides, so salves stop standing in for surgery. - Make tulle gras on boiled gauze for burns and grafts. - Patch-test new salves on the inner arm for 48 hours before using them on eczema or leg ulcers. - Hold standardised arnica tincture and comfrey extract. - Record outcomes, including failures, so that in five years the district knows whether calendula beats its plain ointment.

The first failure to expect is supply. Petrolatum runs out, so the tallow, wax and drying sheds must be working before it does.

Protocols

Protocol 1. Rendering fat for salves

- ☐ Use leaf fat from around the kidneys. Cut away meat and blood.
- ☐ Spread it in a cool airy place for a few hours (BPC 1911).
- ☐ Mince small. Partly frozen fat cuts easily.
- ☐ Melt slowly over a water bath at about 55 to 60 degrees, stirring, with no smoking or browning. About 2 to 4 hours for 2 kg [VERIFY].
- ☐ Strain through clean dry cloth.
- ☐ Pour boiling water over the fat, stir, let it set, lift the cake and scrape off the water and dirt below. Repeat once.
- ☐ Remelt gently until it stops crackling and foaming. Strain again.
- ☐ Fill small jars to the top, cool uncovered, then cap. Label with the animal and date.
- ☐ Keep cold and dark. Use lard within 6 months and tallow within 12. Smell it before each use, and discard it if sharp, stale or paint-like.
- ☐ Put oily cloths in water in a closed tin, or spread them flat outside.

Protocol 2. Infused oil

- ☐ Use dried herb that snaps, not bends (THRIVING library, ME-04).
- ☐ Weigh herb to oil: calendula 1 to 10, comfrey root 1 to 5, St John's wort 1 to 5 to 1 to 10, plantain 1 to 5.
- ☐ Use fresh sunflower or olive oil, never linseed.
- ☐ Choose a method:
  - warm: water bath at 40 to 60 degrees for 2 to 4 hours, never over 70

  - room: closed jar, shaken daily, for 3 days to 2 weeks
  - sun: 2 to 6 weeks.
- ☐ Keep the herb under the oil.
- ☐ Strain and press. Stand 2 days, then pour off the clear oil, leaving any watery or cloudy layer.
- ☐ Discard any cloudy, bubbling, sour or mouldy oil untasted.
- ☐ Make it into salve within a week, or keep it sealed, cold and dark for at most 3 months [VERIFY].
- ☐ Never eat it (THRIVING library, ME-01).

Protocol 3. Salve

- ☐ Weigh 1 part beeswax to 4 parts infused oil (1 to 3 in hot weather, 1 to 5 for soft). With lard or tallow, start at 1 to 10.
- ☐ Grate the wax and melt it over a water bath at about 65 degrees, never over a direct flame.
- ☐ Stir in the warm oil until clear.
- ☐ Test a teaspoon on a cold plate. Add oil if too hard, or wax if too soft.
- ☐ Pour into clean dry jars, let them set uncovered, then cap.
- ☐ Label with plant, part, ratio, base, date and maker. For comfrey add: EXTERNAL ONLY, INTACT SKIN, 10 DAYS, NOT UNDER 18, NOT IN PREGNANCY.
- ☐ Use within 12 months, or 18 if kept cold.
- ☐ Take it out with a clean dry spatula, not fingers.

Protocol 4. The three household salves

Plain ointment. - [ ] 200 g beeswax to 800 g lard or light oil (1 to 4), or salvaged petrolatum as it comes. - [ ] Use: a thin layer on washed grazes, cracked skin, lips and the nappy area, around a draining wound, and on gauze. - [ ] Not on fresh burns, or on deep, dirty, bitten, red, hot or discharging wounds.

Calendula salve. - [ ] Infuse 50 g dried flowers in 500 g oil (1 to 10). Strain, then add 125 g beeswax (1 to 4), giving about 8 per cent herb [my arithmetic]. - [ ] Use: a thin layer 2 to 4 times daily on sunburn, inflamed or chafed skin and small clean wounds. - [ ] Not under 6 or with daisy-family allergy. Stop at any itchy rash. See the healer after a week (EMA calendula 2018).

Comfrey root salve. - [ ] Infuse 100 g dried root in 500 g oil (1 to 5). Strain, then add 125 g beeswax. - [ ] Use: a thin layer twice daily over a sprain, bruise or aching joint, on unbroken skin, for at most 10 days. - [ ] Never on wounds, under 18, in pregnancy or breastfeeding, or near the mouth or eyes (EMA comfrey 2024). - [ ] Store apart from food and the other salves.

Protocol 5. Honey and fat dressing for a burn after day 1

- ☐ Day 1: 20 minutes of cool water and nothing else (THRIVING library, WO-04).
- ☐ From day 2, wash with boiled, cooled water and mild soap.
- ☐ Mix equal parts honey and ghee or oil, at skin warmth.
- ☐ Spread on boiled, dried gauze, lay it on the burn, then add a pad and a bandage.
- ☐ Change every 1 to 2 days, or sooner if soaked.
- ☐ No honey under 12 months.
- ☐ If there is smell, pus or fever, stop and go to WO-04.

Protocol 6. Cold cream, small batch

- ☐ 25 g beeswax, 100 g light oil, 60 to 75 g boiled, cooled water or rose water [VERIFY, scaled from Galen's cerate].
- ☐ Melt the wax in the oil over a water bath. Warm the water to about the same temperature.

- ☐ Off the heat, beat the water in a thin stream into the oil, and keep beating as it cools.
- ☐ Spoon into a jar scalded with boiling water and dried.
- ☐ Keep it cold and use within 2 weeks [VERIFY]. Discard it at any smell change or mould.

Protocol 7. When not to use a salve

- ☐ Not washed yet? Wash first (THRIVING library, WO-02).
- ☐ Deep, dirty, a bite, a puncture, crushed, or older than a day and red, hot or smelling? No salve. Irrigate, leave open, dress dry and bulky.
- ☐ A fresh burn? Cool water only today.
- ☐ Pus under the skin? It needs opening, not grease.
- ☐ A baby? No comfrey, arnica, essential oil, mustard oil or honey under 12 months, and nothing in the nose.
- ☐ Past reaction to lanolin, calendula, arnica or chamomile? Plain ointment only.
- ☐ Skin redder, itchy or weeping after two days of salve? Stop and wash it off.

Numbers to carry

1. **2.0 against 0.9 per cent:** infection on petrolatum against bacitracin, not significantly different, with no allergy on petrolatum.
2. **1 wax to 4 oil:** the standard salve. Use 1 to 3 in heat, 1 to 5 for soft.
3. **40 to 60 degrees, never over 70:** for infusing. Wax melts at 62 to 65.
4. **Lard 6 months, tallow 12, salve 12 to 18:** kept cold, dark and dry.
5. **10 days, intact skin, over 18:** comfrey, under 1 microgram of pyrrolizidine a day, never by mouth.
6. **Calendula 1 to 10 in oil, 2 to 10 per cent in salve:** not under 6.
7. **20 minutes of water and nothing else:** a fresh burn.
8. **5 ml:** enough essential oil to poison a child severely.
9. **0.71:** the risk ratio for infection with plant oil on premature babies.

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