ME-07 The heart and the poison garden: digitalis, atropine, ergot, ephedra, strychnine, colchicine

HEALING after the FALL, research library, ME-07

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

Findings by section

1. The question, and what the library has already settled

This report decides which narrow-margin plant drugs a village may use, and under what rule. ME-02 sets out the one-in-a-village rule (one named preparer, one source bed, one method, a logbook, a locked store), the grain of 64.8 mg and Withering's dosing rules (THRIVING library, ME-02). ME-13 corrects ME-02: the bitterness value needs a quinine standard, a water bath and a panel, and must never be used on narrow-margin plants, and frog and pigeon bioassays err by 30 to 300 per cent, too much for a drug with an index of about 2 (THRIVING library, ME-13). I follow ME-13. ME-14 gives the poison table and the organophosphate atropine regimen, and MA-02 the ergot record (THRIVING library, ME-14, MA-02). CH-02 and CH-03 are not in the library, so the asthma question is answered from the record alone.

The plants fall into three groups. - **One plant the village cannot easily replace.** Foxglove treats the breathlessness and swollen legs of heart failure, above all with a fast, irregular pulse. - **Plants whose pure drug is worth having and whose raw plant is not.** Deadly nightshade and its relatives (atropine), ergot (ergometrine), ephedra (ephedrine) and autumn crocus (colchicine). - **Plants with no place at any rung.** Nux vomica, monkshood, the two oleanders, white hellebore and the Calabar bean.

One finding runs through all of them. **The therapeutic index of the pure drug is not the therapeutic index of the plant.** Potency varies between plants, parts, seasons and years, and for most of these plants that variation closes the margin altogether.

2. Foxglove (*Digitalis purpurea*, leaf)

Identification. The common foxglove is a biennial. In its second year it carries a tall spike of purple, spotted, tubular flowers. Withering took the leaf at flowering, removed the mid-rib and dried it (THRIVING library, ME-02). The dangerous lookalike is comfrey (*Symphytum officinale*), whose leaves resemble foxglove's before it flowers. In August 1977 a United States couple drank "comfrey" tea made from foxglove, and the wife died (CDC 1977). In Taiwan nine people made the same mistake and three developed significant cardiotoxicity (J Chin Med Assoc 2010), and a Taiwanese woman of 55 collapsed in ventricular fibrillation just before antidote infusion (APAMT n.d.). The leaves are most toxic at the start of flowering, when two or three may be fatal, though their bitterness often deters eating (Hospital Medicine 2002).

The tradition on its own terms. Withering did not discover foxglove. He met it inside a family receipt for dropsy that "an old woman in Shropshire" kept secret. The receipt held about twenty herbs, and Withering, a botanist,

judged foxglove to be the active one (Withering 1785). The healer's name is lost. The familiar name and portrait of "Mother Hutton" were invented in 1928 for a Parke-Davis advertising series, and Krikler (1985) traced the myth to its source. English country healers treated dropsy with a compound remedy whose active part was foxglove, and a physician learned to give that part alone, in measured doses.

What the record shows. Withering treated 163 patients between 1775 and 1784. Thirteen colleagues added 55 more. Aronson's reanalysis, as summarised by Wettrell (2019), puts the benefit at roughly 65 to 80 per cent in dropsy and almost nil in ovarian dropsy or tuberculosis. Twelve of the patients were children aged 3 to 15 (Wettrell 2019). I could not read Aronson's own tally.

Withering's rules are the core of any village protocol: - **Dose.** The dried leaf powder was given "from one to three grains of this powder twice a day". An infusion was made from a dram of dried leaves steeped for four hours in half a pint of boiling water, and "one ounce of this infusion given twice a day" was a medium adult dose. Green leaves weigh three times the dried. - **Stopping rule.** The drug was stopped "upon the first appearance of any one of these effects": on the kidneys (more urine), the stomach (nausea), the pulse (slowing) or the bowels (Withering 1785). - **Who it suits.** Patients whose "pulse be feeble or intermitting, the countenance pale, the lips livid, the skin cold" did well. - **Who it fails.** It "seldom succeeds in men of great natural strength, of tense fibre, of warm skin, of florid complexion, or in those with a tight and cordy pulse" (Withering 1785).

Read today, the first description fits failing hearts with an irregular rhythm, and the second fits a strong heart or high blood pressure, where digitalis gives little and costs much [VERIFY: my inference].

Withering also recorded the harm. One Edinburgh patient's pulse fell to 44 and then to 35. Case XXXI followed "imprudent and unlimited use". For overdose he rejected cordials, found small doses of opium sometimes useful and was "more confident of the advantage from blisters" (Withering 1785).

Modern evidence. - **DIG trial.** The Digitalis Investigation Group randomised 6,800 patients with an ejection fraction of 0.45 or less to digoxin or placebo, with a mean follow-up of 37 months. Mortality was unchanged (34.8 against 35.1 per cent). Admission for worsening heart failure fell from 34.7 to 26.8 per cent (risk ratio 0.72, 0.66 to 0.79) (Digitalis Investigation Group 1997). - **DIGIT-HF.** In 2025 the trial tested digitoxin, the main glycoside of *D. purpurea* leaf, in 1,212 patients. The composite of death or first admission for heart failure fell from 44.1 to 39.5 per cent (hazard ratio 0.82, 0.69 to 0.98). Death alone was 27.2 against 29.5 per cent, which was not significant. Serious adverse events were 4.7 against 2.8 per cent (Bavendiek 2025). - **RATE-AF.** In 160 patients aged 60 and over with permanent atrial fibrillation, low-dose digoxin matched bisoprolol on quality of life at six months, with fewer adverse events (29 against 142) (Kotecha 2020).

Digitalis relieves symptoms, keeps people out of hospital and slows a fast irregular heart. It does little or nothing to prolong life.

Why the leaf is harder than the tablet. The United States Pharmacopeia standardised powdered leaf so that 100 mg equals one USP Digitalis Unit. It required a minimum of 0.3 per cent cardenolides and drying at no more than 60 degrees C (USP 35). Leaf from two Colombian sites held 17 to 24 mg of digitoxin and 166 to 183 mg of gitoxin per 100 g of dried leaf (Colombian leaf study). Two facts follow. - **The leaf is a mixture.** Its main glycosides differ in potency. - **Digitoxin lingers.** Its half-life ranges from 2.4 to 16.4 days, with a mean of about 7.6 days, and it is cleared mainly by the liver. Digoxin's half-life is 1.5 to 2 days, and the kidneys clear it (Perrier 1977). A daily leaf dose therefore keeps building for about a month before it levels off, and poisoning, once reached, lasts a week or more [VERIFY: inference from the half-life]. A toxic effect seen today may come from last week's doses.

This is why Withering's slow titration worked where fixed herbal doses killed. The therapeutic index is about 2 (THRIVING library, ME-02), and the therapeutic range of digoxin is only 0.5 to 2 ng/ml (WikEM n.d.).

The poisoning picture. - **Signs.** Loss of appetite, nausea and vomiting come first. Then come yellow or blurred vision (xanthopsia), a slow or newly irregular pulse, confusion and, at the end, ventricular arrhythmia. Bidirectional

ventricular tachycardia is nearly pathognomonic (WikEM n.d.). - **Mortality.** Untreated significant poisoning kills 20 to 30 per cent of patients (WikEM n.d.). - **Potassium.** A high blood potassium predicts death. Bismuth and colleagues studied 91 digitoxin poisonings in Paris between 1967 and 1972. Every patient whose first potassium was above 5.5 mmol/l died, and every patient below 5.0 survived (Bismuth 1973, read only in a secondary summary). BMJ Best Practice gives a 50 per cent mortality for untreated acute poisoning with potassium of 5.0 or more (BMJ Best Practice n.d.). - **Treatment.** Before the Fall, digoxin-specific antibody fragments (Fab) reverse poisoning within hours. After the Fall there is no antidote, and Protocol B gives what the village can do.

Verdict. Withering's titration of the leaf earns grade B, and the modern glycoside grade A. Foxglove is the only plant in this report that passes the one-in-a-village test (section 9).

3. The nightshades and their antidote: belladonna, thorn apple, henbane and the Calabar bean

Identification. - *Atropa belladonna* (deadly nightshade): the leaf and root are used. Its glossy black berries look like cherries and taste sweet, which is how children are poisoned. - *Datura stramonium* (thorn apple, jimson weed): the leaf and the seeds, carried in a spiny capsule, are used. - *Hyoscyamus niger* (henbane): the leaf and seed are used.

Belladonna leaf holds 0.2 to 2.0 per cent alkaloids, Datura varies up to twentyfold, and one wild Egyptian leaf measured 2.88 per cent against a pharmacopoeial minimum of 0.30 to 0.35 per cent (THRIVING library, ME-02, ME-14). The same weight of leaf can carry ten times the dose.

The traditions on their own terms. In Ayurveda, Dhattura (*Datura metel*) is an *upavisha*, a secondary poison. It is used only after *shodhana*, a purification by soaking and boiling in media such as cow's urine and milk, and its uses include breathlessness (Ayurveda review via search). Datura species also have ceremonial and initiatory uses in several traditions. Under the library rule, those uses exist and are restricted, and they are not described here (THRIVING library, SY-04). The European asthma tradition came from India. In 1802 James Anderson, physician-general at Madras, told Major-General William Gent of a local remedy: smoking the root of *Datura ferox*. Gent passed it to Dr Sims in England, and English gardens soon grew *D. stramonium* for it. Henry Hyde Salter (1860) and William Osler (1901) endorsed it, and brands such as Potter's, Himrod's and Asthmador sold it until the 1960s. Between 1968 and 1978 it was abused recreationally, with occasional deaths (Jackson 2010). The pharmacology is plausible, because atropine-like drugs relax the airways [VERIFY: modern inhaled anticholinergics are the descendant, not read for this report].

The poisoning record. - **Anticholinergic syndrome.** The patient is hot, dry, flushed, blind to near objects and delirious, with a racing pulse and a full bladder. - **Datura outbreaks, 1994** (CDC 1995): - In El Paso in June 1994, two boys of 16 and 17 died after drinking a root tea with alcohol. - On Long Island, 14 young people aged 14 to 21 ate 30 to 50 seeds each. - In Los Angeles, six teenagers drank a tea, and four needed intensive care. - **Dose figures.** A seed holds about 0.1 mg of atropine. Onset comes in 30 to 60 minutes, and effects last 24 to 48 hours. MMWR gives the adult lethal dose as 10 mg or more of atropine (CDC 1995). - **Where the lethal figures disagree.** ME-02 gives 10 mg as a delirium dose and 65 mg as possibly fatal. A secondary compilation reports adult deaths at 50 to 100 mg and a recovery after 1 g. The atropine label says that 10 mg or less may kill a child (Pfizer n.d.). The sources disagree by a factor of five or more on the adult figure. The safe reading is that 10 mg can kill a child and may kill a frail adult.

Children survive more often than the folklore suggests. - Caksen and colleagues treated 49 Turkish children for belladonna poisoning. Six were severe, and none died (Caksen 2003). - During the 1991 Gulf crisis, 240 Israeli children received accidental doses from atropine autoinjectors. Eight per cent were severely atropinised, and none died (Gulf crisis survey 1992). - Popular sources say two to four berries can kill a child. A Moroccan report gives two to three berries as toxic. I found no reliable lethal count [VERIFY].

The deaths cluster in adolescents and adults who take large amounts of seed or root, often with alcohol.

The real uses, and who should supply them. 1. **Organophosphate poisoning.** The atropine regimen is in

ME-14. ME-14 says that atropine from belladonna "cannot be titrated against a dying patient". I partly disagree. In organophosphate poisoning the endpoint is visible: a dry chest and a pulse above 80. Huge doses are tolerated, so titration is possible in principle. The real obstacle is the route. An oral leaf preparation will not absorb reliably in a patient who is vomiting, convulsing or unconscious, and the potency is unknown. Leaf atropine stays at grade D, as salvage only, at the district. 2. **Drying secretions before ether, and treating a dangerously slow pulse.** These need salvaged atropine ampoules, not the plant. The working adult dose is 0.4 to 1 mg (THRIVING library, ME-02) [VERIFY with a second source]. 3. **Asthma.** Stramonium smoking has a 150-year record of relief, abuse and poisoning, and it earns grade C for benefit. I found no dose from two independent sources, so this report gives none [VERIFY]. A district could hold stramonium leaf for adult asthma under the rule. A village should not.

Physostigmine and the Calabar bean (*Physostigma venenosum*, seed). The bean comes from the Cross River country of Old Calabar, in present south-eastern Nigeria. Fraser (1867) reported that the people of the region called it *esere* and used it as an ordeal for the accused, and that "upwards of 120" died each year. That figure is an unverified estimate from the 1860s. The sources I read do not name the Efik [VERIFY]. Those who vomited survived. In Edinburgh, Robert Christison took a dose while shaving and saved himself by drinking his shaving water as an emetic (Christison anecdote via search).

Physostigmine reverses the anticholinergic syndrome. Pentel and Peterson (1980) reported two patients who went into asystole after 2 mg in tricyclic antidepressant overdose with a wide QRS. Arens and Kearney (2019) pooled 2,299 patients and found adverse effects in 18.1 per cent (mostly salivation and vomiting), symptomatic bradycardia in 0.35 per cent (including three arrests) and seizures in 0.61 per cent. They judged it safe once a prolonged QRS is excluded, which needs an ECG. The bean is grade X at every rung, and salvaged physostigmine is district salvage only, as in ME-14. For a delirious child the village has quiet, shade, cooling, an emptied bladder and time, and the record above shows that these usually suffice.

4. Ergot (*Claviceps purpurea*, sclerotia on rye)

Identification. Ergot sclerotia are long, black, hard, narrow pegs that replace grains in the ear, mostly of rye. The sclerotia were described this way in 1582. Ergot also grows on other grasses: the Wollo outbreak of 1977 to 1978 came from wild oats mixed into barley (THRIVING library, MA-02).

The tradition on its own terms. German midwives called it *Mutterkorn*, "mother corn". Adam Lonicer's *Kreuterbuch* (Frankfurt, 1582 edition) records it as a proved means to bring on the pains of the womb. The reported dose was three pegs, about 0.5 g, repeated if necessary (Lonicer 1582, read only through secondary sources). MA-02 dates the passage to 1565. The editions differ, since the work first appeared in 1557, and I could not read the original [VERIFY]. One review notes that Sun Simiao's seventh-century *Qianjin Fang* and Li Shizhen's *Bencao Gangmu* do not mention ergot. Within this report's record, the midwife's use is therefore a European tradition.

What the record shows. MA-02 gives the story in full: Prescott's 4 lost babies in 22 first labours (1813), the restriction to bleeding after birth from 1828, the isolation of ergometrine by Dudley and Moir in 1935, and a Cochrane risk ratio of 0.52 for haemorrhage against 2.60 for high blood pressure, with no benefit from oral ergometrine (THRIVING library, MA-02). I could not read Dudley and Moir's dose text.

Two newer facts change the balance. - **WHO guidance.** WHO's 2025 consolidated guideline no longer recommends ergometrine to prevent postpartum haemorrhage, because its benefit is limited and its adverse effects are frequent. The 2018 guidance had allowed it only where hypertension could be safely excluded (WHO 2025, read only as a search summary). - **The label.** The UK product label gives 200 to 500 micrograms intramuscularly after the placenta is delivered, or when bleeding occurs. Intravenous use at 250 to 500 micrograms is for emergencies only. The label forbids use in the first or second stage of labour, before the anterior shoulder is delivered and before the last baby of a multiple birth. It also forbids use in severe hypertension, pre-eclampsia, eclampsia, severe heart, liver or kidney disease, occlusive vascular disease and sepsis. Ampoules are stored at 2 to 8 degrees C, protected from light, or at up

to 25 degrees C for no more than 12 weeks (Ergometrine SmPC n.d.).

The brief's 0.2 to 0.5 mg range is confirmed by the label and by MA-02.

Why the raw spur fails. Sclerotia carry many alkaloids, and ergometrine, the one that contracts the uterus quickly, is usually a minor share. - **Uterine share.** In inoculated rye studied by HPLC, ergometrine was about 3 per cent of total ergot alkaloids in 2018 and about 19 per cent in 2019 (Kodisch 2020). - **Total content.** Alkaloids range from 59 to 4,200 mg/kg of sclerotia (THRIVING library, MA-02). - **What remains.** The rest of the alkaloid load is mostly the ergotamine-type alkaloids that narrow the arteries and cause gangrene [VERIFY: inference from the alkaloid profiles described]. - **Storage.** Ergometrine is the least stable drug ME-13 examined. One survey cited in MA-02 found only 32 of 100 samples within specification, with losses of up to 20 per cent a month in heat (THRIVING library, MA-02, ME-13).

A spur can therefore carry little of the useful alkaloid and a great deal of the harmful one, and the balance changes from year to year.

The two ergotisms. Ralph Stockman described two distinct diseases from ergot bread. The gangrenous form, burning limbs that blacken and fall off, came almost entirely from France. The convulsive form came mostly from Germany (Stockman, via search). In 1932 *Nature* reported George Barger's explanation, which drew on Edward Mellanby's work in Sheffield: - Around 1770 an epidemic in Sologne was gangrenous, while one in Hanover was convulsive. - Mellanby's dogs convulsed on 1 to 2 g of ergot a day only when their diet lacked vitamin A. - Sologne was dairy country (Nature 1932).

Eadie proposed another cause: differences in alkaloid chemistry between fungal strains, with the convulsive form resembling serotonin toxicity (Eadie 2003, abstract only). The question is open.

Even a modern outbreak resists explanation: at Pont-Saint-Esprit in 1951 about 250 to 300 people fell ill and four to seven died, and ergot is only the majority view (Pont-Saint-Esprit, Wikipedia).

Verdict. Raw ergot is grade X at every rung, and before delivery it is X absolutely. Salvaged ergometrine earns grade A for preventing haemorrhage (the Cochrane evidence) and B for treating it once the baby is out, and it is second-line where oxytocin exists. It must be kept cold and dated, and it must never go to a woman with high blood pressure. I agree with MA-02.

5. Ephedra (*Ephedra sinica*, green stem)

Identification. Ephedra is a low shrub of jointed, green, almost leafless stems from the dry north of China. *E. equisetina* and *E. intermedia* are traded as the same herb. The roots contain no alkaloids (Planta Med 1993). The jointed stems recall horsetail (*Equisetum*), which does no harm of this kind [VERIFY].

The tradition on its own terms. In Chinese medicine, Ma huang is acrid, slightly bitter and warm, and it enters the Lung and Bladder channels. It releases the exterior by opening the pores to sweat and disperses wind-cold. It diffuses Lung qi and directs it downward to calm wheezing, and it promotes urination for oedema. Its patterns are wind-cold with fever, chills, no sweat and a floating tight pulse, and cold wheezing with thin white sputum. Raw Ma huang is the stronger sweat-maker. The honey-fried form is gentler and is used for cough and asthma (5000yan n.d.).

The classic formula is Ma Huang Tang, from the *Shang Han Lun* attributed to Zhang Zhongjing. In it, Ma huang is boiled first and its froth is skimmed off before the other herbs go in (5000yan n.d.) [VERIFY: whether this was the source for the froth instruction].

Two sources give the dose range in decoction:

Source	Daily dose in decoction
5000yan n.d.	1.5 to 10 g
Acupuncture Today n.d.	3 to 9 g

The tradition forbids Ma huang in spontaneous sweating from exterior deficiency, in night sweats from yin deficiency, in high blood pressure and in pregnancy (Acupuncture Today n.d.). The tradition treats it as a strong drug for a specific pattern, not as a tonic.

What the record shows. Nagai isolated ephedrine in 1885 or 1887, as the sources differ. In the 1920s Ko Kuei Chen and Carl Schmidt at Peking Union Medical College showed its value in asthma at much smaller doses, and Eli Lilly made ephedrine sulphate a standard asthma drug (Ko Kuei Chen biography n.d.). I could not find their doses.

Measured content in the stem: - **Standards.** The Chinese Pharmacopoeia requires at least 0.80 per cent ephedrine plus pseudoephedrine (cited in the XFBD trial protocol). The Japanese Pharmacopoeia requires 0.7 per cent. - **Measured means.** E. sinica averaged 1.594 ± 0.467 per cent in one study (Planta Med 1993) and 1.365 ± 0.624 per cent in a 64-sample study [VERIFY source].

At 1.4 per cent, 9 g of stem holds about 125 mg of alkaloid before decoction losses [VERIFY: my arithmetic, and decoction yield is unknown]. That is well above the 32 mg a day at which stroke risk rose.

The harm record. - **FDA reports.** Haller and Benowitz (2000) reviewed 140 FDA reports. They judged 31 per cent definitely or probably related to ephedra and 31 per cent possibly related. Of the related events, 47 per cent were cardiovascular and 18 per cent neurological. The commonest were hypertension (17), palpitations or tachycardia (13), stroke (10) and seizures (7). A press account adds about ten deaths and 13 permanent disabilities (Haller and Benowitz 2000, abstract and press summary). - **Meta-analysis.** Shekelle and colleagues found weight loss of only 0.6 kg a month over placebo. Psychiatric, autonomic and gut symptoms and palpitations were 2.2 to 3.6 times more likely (Shekelle 2003). - **Stroke study.** In the Hemorrhagic Stroke Project, 702 cases, doses above 32 mg a day were linked to a more than 3.5-fold risk of haemorrhagic stroke (Morgenstern 2003, press summary). - **The ban.** The FDA banned ephedrine-alkaloid supplements by a final rule of 11 February 2004, effective 12 April 2004, citing "unreasonable risk" and a record of 133,000 pages (FDA 2004, GAO 2004).

The harm fell on young people taking it for weight or sport, outside any pattern the tradition recognises.

Verdict. Ephedra as a stimulant, slimming aid or work tonic is grade X. The stem decoction for adult asthma earns grade C. The village may use it under the rule only with a blood-pressure cuff, at the low end of the traditional range, and never in pregnancy, the old, high blood pressure or chest pain.

6. Nux vomica (*Strychnos nux-vomica*, seed)

Identification. Nux vomica is a tree of South and South-East Asia. Its flat, grey, velvety, button-shaped seeds hold about 1.03 ± 0.51 g of strychnine and 0.46 g of brucine per 100 g (Thai seed study, via search) [VERIFY]. A few grams of seed can therefore hold a lethal adult dose [VERIFY: my arithmetic].

The tradition on its own terms. In Ayurveda, Kupilu is an *upavisha*, used only after *shodhana*. *Shodhana* soaks and boils the seed in sour rice gruel (*kanji*), ginger juice, cow's urine or milk. Mitra, Shukla and Acharya (2011) found that kanji cut strychnine by 39.25 per cent and ginger juice by 67.82 per cent, and processing raised the rat LD50 from 256 to 2,600 mg/kg (Setty 2009). The tradition knows the seed is a poison and has built a method to tame it, but even after the best treatment measured a third of the strychnine remains.

The Western record. Western medicine sold strychnine as a bitter tonic, as in Easton's syrup of iron, quinine and strychnine, about 1870 to 1929 (Wellcome n.d.). By the 1920s, JAMA reported that strychnine pills were the commonest cause of fatal convulsions in children under five (JAMA abstract via search). At the 1904 St Louis Olympic

marathon, Dr Lucas gave Thomas Hicks one-sixtieth of a grain (about 1.1 mg) of strychnine sulphate with egg white at 19 miles, and then a second dose with brandy. Hicks won and collapsed (1904 marathon, Wikipedia, quoting Lucas).

Toxic doses.

Group	Fatal or toxic dose	Source
Adult	Fatal at 30 to 100 mg	Barile 2019, LITFL snippet
Adult	Deaths reported at 5 to 10 mg	Critical Care review snippet [VERIFY]
Child	Up to 15 mg can kill	Barile 2019
Child	Effects seen at 2 mg	Critical Care review snippet

Survival has followed 3,750 mg in an adult who probably vomited.

The poisoning picture. The patient stays awake while spasms, set off by noise and touch, arch the back and clench the jaw. Death comes from exhausted breathing, overheating and muscle breakdown. Hospitals give benzodiazepines and control the airway. The village can offer a dark, silent room, no handling, cooling and, at the district, a salvaged benzodiazepine [VERIFY].

Verdict. Grade X at every rung. Safer bitters give the same appetite tonic, provided the gentian is not white hellebore (section 8).

7. Autumn crocus (*Colchicum autumnale*, corm and seed)

Identification. Meadow saffron flowers pale purple in autumn, without leaves. Its broad, glossy leaves and seed capsule come up in spring, in the same damp meadows and woods as wild garlic (*Allium ursinum*). The spring leaves are the trap. Wild garlic leaves smell of garlic when crushed and grow singly on a stalk. Colchicum leaves have no smell and sheathe one another [VERIFY: field features not taken from a source read for this report]. Lily of the valley (*Convallaria majalis*), itself a cardiac glycoside plant, is the third member of this confusion [VERIFY].

The traditions on their own terms. In Unani medicine, Suranjan is the dried corm of *Colchicum luteum*. It is used for *niqris*, gout, and for *waja ul mafasil*, joint pain, in the formulations Habb-i-Suranjan, Majun-i-Suranjan and an oil, Roghan-i-Waja ul Mafasil, for external use (BIS 2024, via search). Unani pairs strong drugs with a corrective (*musleh*), and I could not find the corrective named for Suranjan. A small study of 20 chronic gout cases reported relief in 94.3 per cent within 30 days and no side effects. It had no controls (Hamdard Medicus 2002, abstract only).

The European line runs from the Ebers papyrus of about 1550 BCE, which lists autumn crocus for pain and swelling, to Nicolas Husson's secret *Eau médicinale* of 1783, used by Benjamin Franklin and shown by the apothecary Want in 1814 to be colchicum. Pelletier and Caventou isolated the active principle in 1819 or 1820, Geiger named it in 1833, and Garrod set out its use in gout in 1859 (MJA 2014). I could not verify Alexander of Tralles' use.

Modern evidence. In the AGREE trial, 1.2 mg followed by 0.6 mg an hour later, 1.8 mg in all, relieved gout flares as well as the old high dose of 4.8 mg. Response was 37.8 per cent against 15.5 per cent on placebo. On the high dose, 76.9 per cent had diarrhoea, and 19.2 per cent had severe diarrhoea (Terkeltaub 2010, read through summaries). The old regimen's endpoint, "until diarrhoea", was therefore the first sign of poisoning.

The narrow margin. Finkelstein and colleagues give these thresholds (Finkelstein 2010):

Dose of colchicine	Usual effect
Under 0.5 mg/kg	Gut symptoms only
0.5 to 0.8 mg/kg	Marrow failure, with about 10 per cent mortality
Over 0.8 mg/kg	Usually death
7 to 26 mg (oral)	Lowest reported lethal doses

The gout course of 1.8 mg sits about four times below the lowest lethal dose [VERIFY: my ratio].

Plant content (INCHEM PIM 142): - Seeds hold 0.2 to 0.8 per cent colchicine, corms 0.4 to 0.6 per cent and fresh flowers 0.1 to 0.8 per cent. Leaves hold "very low" amounts. - About 5 g of seed or 20 mg of colchicine may kill an adult, and 1 to 1.5 g of seed may kill a child.

The leaves are low in colchicine, but people eat them by the handful as a salad. A victim died at 48 hours in Graz in 1999 (Klintschar 1999), Croatia recorded deaths in 2001 and 2004 (Brncic 2001, Croatian report 2004), and in Slovenia a man of 76 with liver and kidney disease died on day three (Brvar 2004), while a woman of 43 survived with growth factor and antibiotics (Gabrscek 2004). In a 2021 series of 16 patients, 15 had marrow suppression and four died (Clinical Toxicology 2021).

The poisoning picture has three phases (Finkelstein 2010, INCHEM PIM 142): 1. **Hours 2 to 24.** Vomiting and profuse diarrhoea. 2. **Days 1 to 7.** Multi-organ failure, marrow failure, bleeding and infection. 3. **Later.** Recovery with hair loss for those who live.

Clarithromycin and grapefruit raise colchicine levels. There is no antidote on the market, and hospitals support the organs and give growth factor. INCHEM advises against stopping the diarrhoea. The village can give oral rehydration (THRIVING library, ME-14) and isolate the patient from infection.

Verdict. The plant is grade X at every rung, and here I disagree with ME-02, which would allow colchicum preparation at the district. The gap between a gout dose and a lethal dose is too small to bridge with a corm of unknown strength. Salvaged colchicine tablets at the district earn grade A, at the AGREE dose, with the exclusions in the harm test. Unani Suranjan is grade D for benefit and X for village preparation.

8. The substitutes offered: monkshood, the oleanders and white hellebore

These plants turn up when a village has no foxglove, or when an herbal suggests them. None should be used.

Monkshood and aconite. The plants are *Aconitum napellus* in Europe and *A. carmichaelii* in China, whose mother root is Chuanwu and whose lateral root is Fuzi. *A. ferox* is the Himalayan Vatsanabha of Ayurveda. The root tuber is the part used and the most toxic. - **TCM on its own terms.** Processed Fuzi is a hot drug used to warm the interior and restore failing yang [VERIFY: phrasing]. Its safety depends on *paozhi*, processing by long soaking and boiling, which breaks the diester alkaloids down to less toxic forms. The longer the boil, from 10 minutes to 2 hours, the lower the aconitine. Traditional Chuanwu is boiled 4 to 6 hours. Doses are 1.5 to 3 g of Chuanwu and up to 15 g of Fuzi (Chan 2021). - **Lethal dose.** Chan gives about 2 mg of aconitine (2 to 5 mg in his table), with toxicity at about a tenth of that. ME-02 gives 1 to 4 mg. The two sources agree within that range. - **Ayurveda.** Vatsanabha is likewise processed, with cow's urine (Ayurveda review via search). - **The record of failure.** Hong Kong recorded 52 cases between 2004 and 2009, mostly from overdose (Chan 2021), and 179 episodes from 2008 to 2020 with 1.1 per cent mortality in a city with intensive care (THRIVING library, ME-14). One patient was given 7 to 11 g of Fuzi against a recommended 1.5 to 4.5 g (Hong Kong case 2000). - **Signs.** Tingling and numbness of the mouth and limbs within minutes to an hour, then vomiting, arrhythmias and collapse. There is no antidote. Hospitals use lidocaine or amiodarone (Chan 2021). - **Verdict.** Grade X. Every safeguard the tradition has, from species and part to hours of boiling, is one the village could get wrong without knowing it.

The oleanders. *Nerium oleander* (all parts, usually the leaf) and yellow oleander, *Cascabela thevetia*, syn. *Thevetia peruviana* (the seed), both carry digitalis-like glycosides. - **Earlier clinical use.** Thevetin was tried in heart failure in 1935 by Arnold, Middleton and Chen. It was about one-eighth as potent as ouabain, and its effective dose sat close to its toxic dose (PROSEA n.d.). Some nineteenth-century writers preferred Nerium to digitalis in certain cases (Felter and Lloyd 1898). - **The Sri Lankan record.** Self-poisoning with yellow oleander seed was first reported in the north of Sri Lanka in the early 1980s. In 1995 Anuradhapura hospital admitted 415 cases in eleven months: 61 per cent were women and 46 per cent were under 21. In a prospective group of 79, 6 per cent died and 43 per cent needed transfer for pacing. The case fatality was put at 10 per cent or more (Eddleston 1999). - **The Fab trial.** Anti-digoxin Fab resolved the arrhythmia within two hours in 15 of 34 patients, against 2 of 32 controls. Mean heart rate rose from 49 to 67 (Eddleston 2000). The antidote works, and the village does not have it. - **Charcoal.** Multiple-dose activated charcoal helped in one trial (de Silva 2003, via APAMT 2024). Pooled across two trials of 1,491 patients, it did not change mortality (risk ratio 1.03) (APAMT 2024). - **Children.** In Queensland, child exposures to Nerium rarely caused serious poisoning (oleander case literature via search). The danger is the deliberate dose and the "digitalis substitute" given by an adult. - **Verdict.** Grade X. There is no titration record, no standard and an epidemic of deaths.

White hellebore (*Veratrum album*, root). Its lookalike is yellow gentian (*Gentiana lutea*), whose root makes bitters and schnapps in the Alps. The two are told apart by their leaves and flowers: Veratrum leaves are alternate and its flowers white or greenish, while gentian leaves are opposite and its flowers yellow (Festa 1996). - **Cases.** Garnier (1985) reported five people poisoned by home-made gentian wine containing Veratrum, with slow pulses, low blood pressure and in one case complete heart block. All recovered with atropine or supportive care. At a youth camp, eleven children drank a fresh herb tea: 82 per cent had gut symptoms, 27 per cent a slow pulse, and all recovered within ten hours (Rauber-Lüthy 2010). Zagler (2005) reported two adults. - **Mechanism.** The Bezold-Jarisch reflex slows the heart and drops the blood pressure, and atropine reverses it. - **Verdict.** Grade X. The main lesson is identification: anyone who digs gentian must see the leaves.

9. Deriving the one-in-a-village rule

ME-02's rule says how to prepare a narrow-margin plant. This section asks which plants may enter it. A plant must pass five tests: 1. It has a use the village cannot meet by safer means. 2. The healer can see a sign of effect before harm, such as nausea, a slowing pulse or more urine. This is Withering's endpoint. 3. It acts slowly enough that the sign comes before the overdose. 4. One preparer can keep one species, one part, one harvest time and one method constant from year to year. 5. The village has some response to poisoning, even if only stopping the drug and waiting.

Plant	Test 1	Test 2	Test 3	Test 4	Test 5	Result
Foxglove leaf	yes	yes	yes, slow digitoxin	yes	weak	Village, under the rule
Ephedra stem	partly	partly, pulse and BP	no, stroke without warning	yes	weak	Village with BP cuff, adults only
Belladonna, thorn apple, henbane	partly	only in organophos-phate poisoning	no	no, up to 20:1	yes	District, salvage only
Ergot	no, ergometrine is better	no	no	no	no	Never
Colchicum	no, tablets are better	no, diarrhoea is the toxicity	no	no	no	Never as plant

Plant	Test 1	Test 2	Test 3	Test 4	Test 5	Result
Aconite, oleanders, Veratrum, nux vomica, Calabar bean	no	no	no	no	no	Never

The result is **a rule of one plant**. Foxglove is the only narrow-margin plant a trained lay healer may prepare at the village, under logbook and locked chest. The pure drugs (atropine, ergometrine, colchicine, physostigmine) are kept as salvaged, dated, cold-stored district stock, and their plants are never substituted for them. Ephedra sits between the lists, and stramonium for asthma is a district decision. All the rest stay in the ground, and near houses where children play, belladonna, thorn apple, monkshood, oleander and autumn crocus are dug out.

Two rules follow from the pitfalls in the brief. - **The healer never tastes a narrow-margin batch** (THRIVING library, ME-13). Bitterness deters people from eating foxglove, but it is not a measure of its strength. - **The logbook records every death and near-miss.** Withering's 163 patients are known because he wrote them down. The deaths from the Shropshire receipt and the Calabar ordeal are not. A village that keeps no record will believe its poisons are rare.

Evidence grades

Remedy	What the tradition says	What the record shows	What science infers	Grade
Foxglove leaf, titrated	Shropshire receipt for dropsy	Withering: 163 cases, 65 to 80% relief	DIG, DIGIT-HF: fewer admissions, little survival gain	B (leaf), A (glycoside)
Foxglove, fixed herbal dose	Compound remedy	Comfrey confusion deaths 1977, 2010	Index about 2, half-life about a week	X
Belladonna leaf for organophosphates	None found	No series found	Endpoint visible, route unreliable	D
Salvaged atropine	Not applicable	Standard drug	Index about 10	A
Stramonium smoked for asthma	Madras 1802, Ayurveda	150 years of use, abuse 1968 to 1978	Plausible anticholinergic bronchodilation	C
Calabar bean, physostigmine	Ordeal of *esere*	Over 120 deaths a year (1860s estimate), 2 asystoles 1980	Safe only with ECG	X (bean), B (district salvage)
Raw ergot	Mutterkorn, Lonicer 1582	Prescott: 4 of 22 babies lost	Ergometrine share 3 to 19%	X
Salvaged ergometrine after birth	Not applicable	Cochrane RR 0.52 for prevention	WHO 2025 prefers other uterotonics	A (prevention), B (treatment)
Ma huang decoction for asthma	Releases exterior, calms wheezing	Ephedrine an asthma drug from the 1920s	Stroke above 32 mg a day	C

Remedy	What the tradition says	What the record shows	What science infers	Grade
Ephedra as stimulant	Not the tradition's use	140 FDA reports, 2004 ban	Weight loss 0.6 kg a month	X
Nux vomica, any form	Kupilu after shodhana	Tonics killed children	Shodhana leaves a third or more	X
Colchicum corm	Suranjan, Eau médicinale	Garlic confusion deaths	1.8 mg works, 7 mg can kill	X (plant), A (tablet)
Aconite	Fuzi after paozhi	Hong Kong 1.1% mortality with ICU	Lethal at about 2 mg	X
Oleanders	Folk cardiac remedy	Sri Lanka at least 10% case fatality	Fab works, village has none	X
Veratrum	Mistaken gentian	Bradycardia series	Atropine reverses it	X

Means ledger

Remedy	Hands alone	Hearth	Garden and still	Village dispensary	District infirmary	Hospital before the Fall
Foxglove	Know the plant, count the pulse	Nothing safe	Grow one bed, dry the leaf below 60 C, weigh it	Titrate by Withering's rules, logbook, locked chest	Same, plus salvaged digoxin, atropine for a slow pulse	Digoxin or digitoxin, blood levels, potassium, Fab
Atropine group	Recognise the syndrome, cool and calm	Shade, water, empty the bladder	Grow nothing near houses	Supportive care, transfer	Salvaged atropine and physostigmine, stramonium by decision	IV atropine, ICU, ECG
Ergot	Recognise spurs and reject the grain	Sieve grain	Nothing	Salvaged ergometrine IM, if cold-stored	Same, plus oxytocin if salvaged	Oxytocin first, carbetocin, surgery
Ephedra	Nothing	Nothing	Grow and dry the stem	Low-dose decoction for adult asthma, BP cuff required	Same, plus salvaged inhalers	Inhaled bronchodilators, steroids
Colchicum	Know the leaf from wild garlic	Rehydration for poisoning	Root it out	Rehydration, isolation	Salvaged colchicine tablets for gout	Colchicine, NSAIDs, growth factor for poisoning
Aconite, oleanders, Veratrum, nux vomica	Identify and avoid	Rehydration, lying still	Root them out near houses	Supportive care	Salvaged atropine, benzodiazepines	Fab, lidocaine, pacing, ventilation

The village dispensary turns foxglove from a poison into a drug through a logbook and a counted pulse. The hospital adds what no rung below can make, an antidote (Fab), blood levels and an ECG, so its advantage is largest in poisoning, not in treatment.

Harm test

Plant	The error that harms	Who must never receive it	Signs it is going wrong	What to do
Foxglove	Fixed dose without titration. Adding a dose before last week's has shown its effect. Mistaking it for comfrey	Children. Anyone with a pulse under 60, vomiting or diarrhoea, dehydration. The frail old without halving the dose [VERIFY]. Strong patients with a "tight and cordy pulse"	Loss of appetite, nausea, yellow vision, pulse under 60 or newly irregular, confusion	Stop. Lie flat. No potassium, no calcium. Count the pulse hourly. Atropine at the district for a slow pulse. Expect a week or more
Belladonna, thorn apple, henbane	Seed or root eaten. Berries by children. Potency varying up to 20:1	Children. The old with an enlarged prostate or glaucoma [VERIFY]. Hot weather	Hot, dry, red skin, wide pupils, racing pulse, delirium, no urine	Shade, cooling, quiet room, empty the bladder. Benzodiazepine at the district. Physostigmine only with an ECG
Ergot	Any use before delivery. Raw spurs at any time. Ergometrine in a woman with high blood pressure	Women in labour before the last baby is born. Pre-eclampsia, high blood pressure, heart disease, sepsis	Cold, white, painful limbs, chest pain, severe headache, convulsions, blood pressure rising	Stop. Keep warm. Treat the bleeding by MA-02
Ephedra	Use as a stimulant or slimming aid. High doses. Daily use	Pregnancy. High blood pressure. Heart disease. The old. Children [VERIFY]	Pounding pulse, severe headache, chest pain, weakness of one side, seizure	Stop. Lie with the head raised. Nothing at the village reverses a stroke
Nux vomica	Any dose	Everyone	Awake spasms set off by sound or touch	Dark, silent room. Cooling. Benzodiazepine at the district
Colchicum	Leaves eaten as wild garlic. Corm used for gout. Colchicine with clarithromycin or grapefruit	Pregnancy. Children. Kidney or liver disease. The old	Vomiting and diarrhoea within hours, then fever, bleeding and falling urine on days 2 to 7	Oral rehydration. Do not stop the diarrhoea. Isolate from infection

Plant	The error that harms	Who must never receive it	Signs it is going wrong	What to do
Aconite	Under-boiling. Wrong species or part. Root mistaken for a vegetable	Everyone at village level	Tingling of the lips and limbs, vomiting, collapse	Lie flat. Transfer. No antidote
Oleanders	Use as a digitalis substitute. Seeds as self-poison	Everyone	As for foxglove, faster	As for foxglove
Veratrum	Root dug as gentian	Everyone	Vomiting, slow pulse, faintness within minutes	Lie flat. Atropine at the district. Most recover within hours

The historical cases of harm are in sections 2 to 8.

Red flags

Signs that the patient will die or be disabled without what the village cannot give. 1. **A pulse under 40, or a new, chaotic irregularity, in someone taking foxglove or who has eaten oleander.** A lethal arrhythmia, and Fab and pacing are out of reach. Stop all glycoside, keep the patient flat and still, give atropine at the district. Some recover over days. 2. **Vomiting in a foxglove patient who is also losing fluid.** Dehydration and potassium shifts make a safe dose toxic. Stop foxglove and rehydrate. 3. **A hot, dry, delirious patient with a temperature rising after nightshade or thorn apple.** Hyperthermia kills where delirium does not. Cool them aggressively. 4. **A woman given ergot before the baby is born, with a hard, unrelaxing womb.** Uterine rupture and the baby's death are near, and nothing at the village reverses it. 5. **A cold, white, painful limb, or chest pain, in anyone exposed to ergot or ergometrine.** Arterial spasm can cost the limb. Stop the drug and keep the limb warm and below heart level [VERIFY]. 6. **A sudden, severe headache or weakness of one side after ephedra.** Haemorrhagic stroke. Raise the head and give nothing by mouth if swallowing is poor. 7. **Diarrhoea that began a day after a wild-garlic meal, now with fever or bleeding.** Colchicine marrow failure, often fatal even with intensive care. Rehydrate, isolate and keep clean. 8. **Tingling lips and a weakening pulse after any root decoction.** Probably aconite. Deaths come within hours.

Honest comfort. When the red flag is a heart that will not hold its rhythm, the village has no way to restart it. The kind course is to keep the room quiet and warm, keep family close, ease breathlessness by sitting the patient up and, where the book's opium rules allow, give a small dose for distress, as Withering himself did. The deaths of glycoside poisoning are often sudden rather than drawn out [VERIFY].

The case against

Against using foxglove at all. The DIG investigators found no survival benefit from digoxin (Digitalis Investigation Group 1997). A drug with an index of about 2 and no survival gain may not be worth the risk. The answer is that DIG patients had hospitals and diuretics, the village patient has neither, and the gain in admissions and symptoms is real. DIGIT-HF's authors themselves urge caution, because serious adverse events rose (Bavendiek 2025).

Against the romance of Withering. Krikler (1985) showed that even the story of the old woman was dressed up for marketing. Withering's 163 patients were selected cases, not a trial, and I could not read Aronson's audit of how many died. Withering is a method, not a guarantee.

Against this report's X for physostigmine. Arens and Kearney (2019) argue that physostigmine is safe and underused when the QRS is normal. A district with a salvaged ECG could reasonably disagree with me.

Against leaving aconite in the ground. Practitioners of Chinese medicine use processed Fuzi daily, and Hong Kong's mortality is 1.1 per cent (THRIVING library, ME-14, Chan 2021). Ayurvedic *shodhana* measurably lowers strychnine (Mitra 2011). These are real achievements, but they depend on identified, processed material and trained practitioners, and the village has neither.

On ergometrine for prevention. WHO 2025 no longer recommends it, while MA-02 keeps it as second-line. The disagreement concerns prevention, not treatment, and where oxytocin exists the village should follow WHO.

Against the herbal romance and the hospital romance. Haller and Benowitz (2000) and Shekelle (2003) show what "natural" stimulants did to healthy young people. Eddleston's oleander work shows that the hospital's answer, Fab, is a vial the village will never see.

10-line summary

1. The therapeutic index of a plant is narrower than that of its pure drug, because potency varies many times between plants and years.
2. Foxglove is the only narrow-margin plant with a use the village cannot replace, and it is the only one a lay healer may prepare.
3. Withering's method of slow titration to nausea, a slowing pulse or more urine is the assay, and no bioassay improves on it.
4. Digitoxin, the leaf's main glycoside, has a half-life of about a week, so foxglove poisoning arrives late and lasts long.
5. Digitalis reduces admissions and symptoms in heart failure (DIG 1997, DIGIT-HF 2025) but not, or only modestly, death.
6. Raw ergot is never used. Salvaged ergometrine, 0.2 to 0.5 mg intramuscularly after the last baby, treats bleeding.
7. Ephedra is X as a stimulant. As a low-dose adult asthma decoction it is C, and a blood-pressure cuff is required.
8. Colchicum, aconite, oleanders, Veratrum, nux vomica and the Calabar bean stay in the ground.
9. Children poisoned by nightshades usually survive with cooling and calm. Deaths cluster in large seed or root doses.
10. Every dose and every death goes in the logbook, and no healer tastes a narrow-margin batch.

Open questions

- What was the outcome tally in Aronson's reanalysis of Withering's 163 cases?
- Is there a reliable lethal number of belladonna berries or Datura seeds for a child?
- What did Dudley and Moir actually give, and by what route?
- What doses did Chen and Schmidt use for ephedrine in asthma?
- What was the historical digitalising dose of standardised leaf? I could not confirm about 1.2 g.
- Does the vitamin A or the strain-chemistry explanation of the two ergotisms hold?
- Can stramonium smoking be dosed safely by a district for adult asthma, and from what source?
- Is the Calabar ordeal history correctly attributed to the Efik, and what do Efik sources say of it?

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At the bedside after the Fall

Household. - **Plants.** Learn foxglove, comfrey, wild garlic, autumn crocus, monkshood, deadly nightshade, thorn apple, oleander and gentian against white hellebore. Remove poison plants from where children play. - **Skills.** Count a pulse for a full minute. - **First failure to expect.** A child eats berries, or an adult picks the wrong leaf.

Village of 300. - **One named healer** keeps one foxglove bed, dries the leaf below 60 degrees C, weighs doses on a grain-capable scale, locks them away and logs each patient's daily pulse and dose. - **Salvaged ergometrine** is kept cold and dated. Ephedra is held for adult asthma only with a blood-pressure cuff. - **To start, it needs** *D. purpurea* seed, a balance, a dry dark store, a lock and a book. - **First failure to expect.** A patient improves, the dose is not reduced, and a week later the pulse falls to 40.

District of 3,000. The district adds salvaged atropine, physostigmine, colchicine and benzodiazepines, an ECG if one survives, a cold store, the decision on stramonium for asthma and the training of village healers. **First failure to expect:** ergometrine that has decayed in a warm store, and a colchicine overdose from a patient who doubles the dose.

Protocols

Protocol A. Foxglove for dropsy with a fast, irregular pulse (village dispensary, adults only) - [ ] Confirm the patient is breathless or swollen, with a pulse above 90 that is irregular or feeble. Do not start if the pulse is under 60, the patient is vomiting or has diarrhoea, or is a child. - [ ] Use leaf from the one recorded bed. Harvest it at flowering, remove the mid-rib, dry it below 60 degrees C and powder it. Record the batch date and weight (THRIVING library, ME-02). - [ ] Start at 1 grain (65 mg) of powder twice a day. This is the low end of Withering's 1 to 3 grains. In the frail and old, start at half a grain [VERIFY]. - [ ] Before every dose, count the pulse for one full minute, ask about appetite, nausea and vision, and estimate the urine. Write all of it in the logbook. - [ ] Stop at the first effect: nausea, loss of appetite, yellow vision, a pulse under 60, a new irregularity or a large rise in urine (Withering 1785). - [ ] After stopping, wait at least 3 days without foxglove. Then resume at half the previous daily dose if the swelling returns [VERIFY: interval based on the digitoxin half-life]. - [ ] Never raise the dose more than once a week [VERIFY].

Protocol B. Foxglove or oleander poisoning (any rung) - [ ] Stop all glycoside. Lay the patient flat and keep them still. - [ ] Count the pulse every hour for at least 3 days. - [ ] Give oral rehydration if there is vomiting (THRIVING library, ME-14). Give no potassium and no calcium. - [ ] At the district, give salvaged atropine for a pulse under 40 with faintness [VERIFY dose: 0.5 to 1 mg]. - [ ] Expect recovery over 1 to 3 weeks after foxglove leaf [VERIFY], and faster after oleander.

Protocol C. A child who has eaten nightshade berries or thorn-apple seeds - [ ] Move the child to shade and a quiet, dim room. Cool with wet cloths. Keep away from water edges and stairs. - [ ] Do not induce vomiting with salt water (THRIVING library, ME-14). - [ ] Watch for 24 to 48 hours (CDC 1995). Check for a full bladder and help the child pass urine. - [ ] At the district, a salvaged benzodiazepine may be given for seizures or severe agitation. Physostigmine only with an ECG.

Protocol D. Salvaged ergometrine after birth (with MA-02) - [ ] Confirm that the baby and any twin are born. Feel the abdomen for a second baby. - [ ] Confirm that there is no known high blood pressure, fits in pregnancy or heart disease. - [ ] Check the ampoule's date and storage. Discard it if it has been above 25 degrees C for over 12 weeks (Ergometrine SmPC n.d.). - [ ] Give 200 micrograms (0.2 mg) intramuscularly into the thigh. Repeat after 2

hours only if bleeding persists [VERIFY interval]. - [ ] Never give raw ergot. Never give anything before the last baby is born.

Protocol E. Gout flare with salvaged colchicine (district) - [ ] Confirm a hot, swollen joint, typically the big toe, in an adult who is not pregnant and has no known kidney or liver failure. - [ ] Confirm no current clarithromycin or erythromycin, and no grapefruit (Finkelstein 2010). - [ ] Give 1.2 mg, then 0.6 mg after 1 hour. That is the total for the flare (Terkeltaub 2010). If tablets are 0.5 mg, give 1 mg and then 0.5 mg [VERIFY]. - [ ] Do not repeat the course within 3 days [VERIFY]. Stop at the first diarrhoea. - [ ] Never prepare colchicum corm or seed.

Protocol F. Identification checks before any harvest - [ ] Comfrey or foxglove: wait for the flower spike. No leaf tea from an unflowered plant. - [ ] Wild garlic or autumn crocus: crush a leaf from each plant picked. If any leaf lacks the garlic smell, discard the whole basket [VERIFY]. - [ ] Gentian or white hellebore: opposite leaves and yellow flowers mean gentian. Alternate leaves and white or greenish flowers mean Veratrum (Festa 1996).

Numbers to carry

1. **Foxglove:** therapeutic index about 2. Start at 1 grain (65 mg) of dried leaf twice a day. Stop at the first nausea or a pulse under 60.
2. **Digitoxin half-life:** about 7.6 days, with a range of 2.4 to 16.4.
3. **Atropine:** 10 mg may kill a child, and a Datura seed holds about 0.1 mg.
4. **Ergometrine:** 0.2 to 0.5 mg intramuscularly, only after the last baby. Discard after 12 weeks above cold storage.
5. **Ephedra:** stroke risk rose above 32 mg a day of alkaloid.
6. **Colchicine:** 1.8 mg treats a gout flare, and 7 mg has killed.
7. **Strychnine:** 30 to 100 mg kills an adult, and 15 mg or less can kill a child.
8. **Aconitine:** about 2 mg kills.
9. **Digitalis poisoning:** potassium above 5.5 mmol/l was fatal in every patient of one series.
10. **Yellow oleander:** case fatality of at least 10 per cent, even in hospital.

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