ME-14 Poisons, overdoses and the antidotes you can make

HEALING after the FALL, research library, ME-14

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

PH-10 ends where this report begins. It covers which plant was eaten, how to tell it apart, how long the latency runs and what happens to a person left alone (THRIVING library, PH-10). None of that is repeated. This is what to do once the mistake has been made.

Findings by section

1. The shape of the problem, and the first correction

WHO put unintentional poisoning at 84,278 deaths worldwide in 2019, with 84 per cent of the earlier 2012 total in low- and middle-income countries (Chen et al. 2023). That is the condition a village will live under, only worse, because the two things that make modern poisoning survivable are a telephone and a ventilator. The central finding should be said at the front. **Almost nothing that saves a poisoned person in a hospital is an antidote. It is airway, breathing, fluid and time.** The antidotes fall into three groups: a few that change outcome and cannot be made (naloxone, acetylcysteine, digoxin Fab, oximes), a few that can be improvised badly (atropine from belladonna, ethanol from a still, vitamin K from leaves, charcoal from a kiln), and a long tail that does not work, some of which kills. A village that works on the third group while the patient stops breathing has the subject backwards.

The second correction is to the manual most likely to be on the shelf. Hesperian's *New Where There Is No Doctor* is the best book of its kind and its poisoning chapter is partly out of date. It says vomiting is "not usually helpful" and "can be dangerous", which is right, then offers two methods anyway: a finger at the back of the throat, and "swallow a spoonful of salt" (Hesperian, Poison). Salt-water emesis has a body count. Türk and colleagues in Hamburg reported three autopsies of people killed by salt given as an emetic, serum sodium to 245 mmol/l, all dead of cerebral oedema (Türk et al. 2005), and three further reports describe deaths or near-deaths at sodium levels of 195, 187 and above, including a woman killed in 1974 after a minor aspirin overdose. One estimate of the fatal amount is 1 g of sodium chloride per kg, which for a 15 kg child is roughly three level teaspoons. **A spoonful of salt is not a first-aid measure, it is a poison with a known lethal dose.** The finger is not lethal in the same way, but the position statements found no outcome benefit from emesis and good evidence of aspiration (Höjer et al. 2013).

2. The one-page poison table

Ranked by how often a village meets the poison multiplied by how fast it kills. "First action" is what hands alone do in ten minutes.

Poison	Source after the Fall	Onset	Signs	First action	Antidote, and can a village have it	Never do
Carbon monoxide	Brazier or stove indoors, blocked flue	Minutes to hours	Headache, nausea, confusion, several people in one room ill at once	Drag into open air, open everything, breathe for them	Oxygen, which a village lacks. Air is the treatment	Do not re-enter without someone holding your ankles
Organophosphate or carbamate	Salvaged drums, unlabelled jars	10 min to 12 h	Wet patient: pinpoint pupils, streaming secretions, wheeze, twitching, paralysis	Strip and wash the skin with soap, gloved. Airway. Breathe for them	Atropine, doubled every 5 min until the chest is dry. Salvage only	Do not stop atropine for a fast pulse
Amatoxin mushroom	Foraging error	6 to 24 h	Violent vomiting and diarrhoea starting late, then false recovery, then jaundice	Oral rehydration solution, measured, for days	Silibinin and acetylcys-teine, neither available, neither proven	Do not let the false recovery on day 2 end the nursing
Opioid	Salvaged morphine, poppy tea	Minutes to 1 h	Pinpoint pupils, slow shallow breathing, unrousable	Count the breaths. Under 12 a minute, breathe for them	Naloxone, unmakeable. Hand ventilation works	Do not leave them sleeping it off on their back
Paracetamol	Salvaged tablets	Nothing for 24 h	Well at first, which is the trap. Then vomiting and jaundice	Charcoal within 1 h. Estimate the dose per kg	Acetylcysteine, salvage only. Oral methionine historically	Do not reassure because they look well at 6 hours
Caustic (lye, acid)	Soap-making, salvage	Immediate	Burnt mouth, drooling, refusal to swallow, chest pain	Wipe the mouth, rinse the lips. Sips of water in the first minutes only	None	**Nothing by mouth after lye.** No vomiting, no charcoal, no acid
Hemlock (*Conium maculatum*)	Foraging error	30 min to 2 h	Burning mouth, tremor, ataxia, ascending paralysis, mind clear	On their side. Prepare to breathe for them	None. Hand ventilation is curative	Do not assume a clear mind means safety

Poison	Source after the Fall	Onset	Signs	First action	Antidote, and can a village have it	Never do
Water hemlock (*Cicuta*, *Oenanthe*)	Foraging error, root	15 to 90 min	Vomiting, then violent convulsions, trismus, fixed grimace	Protect the head, clear the mouth between fits	Diazepam if salvaged	Do not put anything between the teeth
Cardiac glycoside (foxglove, oleander, lily of the valley, yew)	Foraging error, hedge, bay substitution	1 to 8 h, yew to 24	Vomiting, then slow or chaotic pulse, yellowed vision, collapse	Lie flat, still and warm, count the pulse every 15 min	Digoxin Fab reverses it and will not exist	No extra potassium. Do not walk them anywhere
Aconite (*Aconitum*)	Foraging error, herbal preparation	10 min to 2 h	Tingling lips and tongue first, then vomiting, then arrhythmia	Lie flat, keep still	None	Do not let them stand up
Methanol or ethylene glycol	Bad still runs, antifreeze	6 to 30 h	Drunk, then deep gasping breathing, then blindness, then coma	Ethanol by mouth at once if they can swallow	**Ethanol.** A village with a still has this one	Do not wait for symptoms. No ethanol to a child without sugar
Cyanide	Bitter cassava badly processed, apricot kernels	10 min to hours	Headache, gasping, collapse, no blueness at first	Fresh air, breathe for them	Thiosulfate and hydroxo-cobalamin, neither available	No mouth-to-mouth without a cloth
Lead	Glaze, solder, pipe, bullets, melted battery	Weeks to months	Colic, constipation, pallor, irritability, clumsiness, then fits in a child	Find and destroy the source	Succimer, salvage only	Do not chelate and send the child back to the source
Long-acting rodenticide	Salvaged bait	2 to 5 days	Bruising, nosebleed, blood in urine, bleeding gums	Rest, pressure on bleeding points	**Vitamin K1**, high dose for months. Not leaves	Do not stop when the bleeding stops

Poison	Source after the Fall	Onset	Signs	First action	Antidote, and can a village have it	Never do
Paraquat	Salvaged herbicide	Mouth burns at once, then days	Mouth ulceration, then breath-lessness rising over days	Charcoal early if available. Comfort	None. Untreatable	**Do not give oxygen**
Castor bean (*Ricinus communis*)	Chewed seeds, usually a child	4 to 10 h	Violent vomiting and bloody diarrhoea	Oral rehydration solution, aggressively	None. Fluid is the treatment	Do not withhold it
Datura, belladonna, henbane	Foraging error, deliberate use	1 to 4 h	Hot, dry, red, blind, mad: dry mouth, wide pupils, no sweat, delirium	Shade, cool water on the skin, a quiet room, someone with them	Physostigmine, salvage only, rarely needed	Do not restrain and leave. They overheat

A table that lists everything prioritises nothing. The commonest entries in a village will be carbon monoxide, caustic from soap-making, a child with an unlabelled jar and a foraging error, and **the "never do" column is worth more than the antidote column.** Every row assumes somebody wrote down the hour of eating and the hour of the first symptom (THRIVING library, PH-10).

3. Decontamination: what survives the evidence

Activated charcoal. The joint position paper of the American Academy of Clinical Toxicology and the European Association of Poisons Centres concluded that single-dose charcoal should not be given routinely, that no evidence shows it improves clinical outcome, and that it is contraindicated unless the airway is intact or protected (Chyka et al. 2005). Volunteer studies using at least 50 g show absorption reduction falling from about 47 per cent at 30 minutes to about 21 at 180. The benefit is real, large in the first minutes, and close to nothing after an hour. MSF gives 1 g per kg under one year, 25 g from 1 to 12, and 50 g over 12 (MSF Essential Drugs), and a New Zealand datasheet gives 1 g per kg to a maximum of 50 g. The village rule is **1 g per kg, up to 50 g, as a slurry, within the hour or not at all.** Charcoal does not bind alcohols including methanol and ethylene glycol, metals including iron and lithium, simple salts, acids and alkalis, or hydrocarbons (MSF, Carbosorb datasheet, Quebec antidote centre). In a caustic ingestion it hides the burn, and in a hydrocarbon ingestion it raises the aspiration risk, which is how kerosene kills children.

How far hearth charcoal falls short. A Kyushu University study of bamboo and cedar found BET surface areas of 791 to 830 square metres per gram for activated carbon against 59 to 357 for the same material merely charred, with iodine numbers of 562 to 1,088 mg/g against 141 to 628. Hearth charcoal therefore has roughly a quarter to a fifth of the surface area, and no human study compares the two in poisoning [VERIFY, none found]. **Stock salvaged activated charcoal as a priority and treat hearth charcoal as a weak last resort**, finely ground, never from a briquette, which contains binders, and never in a drowsy patient.

Emesis and lavage. Höjer and colleagues (2013) found no convincing evidence that ipecac improves outcome and warned that it delays charcoal and oral antidotes. Benson and colleagues (2013) concluded that gastric lavage should not be a routine method, that evidence of benefit even in special cases is weak, and that it should only be done by trained operators, with aspiration at about 3 per cent and vagal asystole reported in cardiac-conduction poisonings. A village has no suction and no tube. **Both are off the list.**

Dilution after a corrosive. Merck says dilution helps only in the first few minutes after a liquid caustic, while WikEM and a Spanish experimental study restrict it to solid or granular alkali, at 120 to 240 ml within 30 minutes, because for liquids the vomiting risk outweighs the benefit. All agree on no vomiting, no neutralising with acid (exothermic, and it adds a thermal burn) and no charcoal. **Rinse the lips and mouth, allow a few small sips in the first minutes if the person is fully awake and not drooling, then nothing by mouth at all.**

4. Breathing for the patient: the antidote a village can always make

The most valuable section here contains no drug. Four poisons in the table kill by stopping the breathing while leaving the brain, heart and liver undamaged: coniine, the opioids, the organophosphates and the neurotoxic venoms in WO-13, and death comes from a reversible problem lasting hours to days. The precedent is Copenhagen in 1952, where Bjørn Ibsen's proposal to Henry Lassen's team at Blegdam Hospital put students on hand ventilation in shifts, some trained in under ten minutes (THRIVING library, IN-16 [VERIFY]). WO-13 records the same in snakebite, where ventilation with room air has been followed by full recovery after more than a month, and quotes Warrell that patients continue to die of asphyxiation because doctors trust antivenom alone (THRIVING library, WO-13).

Secondary summaries of the 2020 American Heart Association and 2021 European Resuscitation Council guidance give **10 breaths a minute for an adult in respiratory arrest with a pulse**, at 500 to 600 ml a breath, and the 2020 paediatric update raised infants and children to **20 to 30 a minute**. The endpoint everywhere is visible chest rise. Real performance is poor both ways: median delivered volumes of 273 and 327 ml in out-of-hospital arrest, against a manikin study finding an adult bag delivering a mean of 808 ml (Siegler et al. 2020). **The bag is bigger than the lung.** Squeeze part of it and watch the chest. Mouth-to-mouth through thin cloth gives about 16 per cent inspired oxygen, enough to live on (Warrell 2010, via WO-13). A salvaged bag and mask is what a dispensary should hunt for, because a bag can be squeezed for days in relays and a mouth cannot. The failure modes are organisational: relays collapse at night, because nobody wrote down who was next.

5. Mushrooms: treatment once the latency has run

The latency rule, tested. PH-10 warns that latency runs in opposite directions and must be taught as two rules. The warning is right, because the two are different kinds of rule. The mushroom rule is **diagnostic**: gut-irritant mushrooms declare themselves in one to three hours and cell-killing ones do not. The colchicum rule is **prognostic within one poison**, where a longer latency implies a smaller dose. Taught as facing rules a reader will remember a contradiction and discard both. Teach one sentence with two halves: **latency tells you which poison, and then, within that poison, how much.**

The boiling finding, tested. PH-10 reports 64 per cent moderate or worse poisoning from boiled *Colchicum* leaves against 33 per cent raw, and grades the folk belief that cooking detoxifies as X. The figures come from a 32-patient retrospective series and the causal claim should be held loosely. Eight of the nine severe or fatal cases were over 65, so age is a large uncontrolled confounder, and their mechanism, that heating releases more colchicine, is a presumption. A simpler one fits: colchicine is water-soluble and heat-stable, so boiling moves it into the broth and the broth is eaten. The rule survives either way and should be taught on the chemistry: **amatoxins, colchicine, aconitine and the cardiac glycosides are all heat-stable, so cooking is neither a test nor a cure.**

Amatoxin. Published series cluster at 10 to 27 per cent case fatality with full modern care, which is fluid, electrolytes and, in a tenth of serious cases, a transplant (THRIVING library, PH-10). The two drugs given almost universally have never been shown in a controlled trial to change survival. Enjalbert and colleagues analysed 2,108 hospitalised patients and reported death or transplant in 5.4 per cent given silibinin against 47.3 per cent given supportive care only (Enjalbert et al. 2002). That looks decisive and is not: the comparison is between published case reports with no protocol and no randomisation, and the appraisers noted the mortality rates did not correlate with the treatments. Ganzert and colleagues compared regimens directly in 367 patients and found no significant difference (Ganzert et al. 2008), and a systematic review of 13 studies and 506 patients on acetylcysteine called the benefit unproven. The

milk thistle sold as the Amanita cure is **grade D at best.** What kills amatoxin patients earliest is fluid and electrolyte collapse, so oral rehydration solution, measured in and out, for three to five days, through a false recovery that will convince everyone the crisis has passed, is the whole of village amatoxin treatment and it is not nothing.

The rest. *Gyromitra* releases monomethylhydrazine, which blocks GABA synthesis, which is why the fits resist diazepam. Pyridoxine replaces the cofactor at **70 mg per kg intravenously to a maximum of 5 g**, over ten minutes, repeatable once, with a benzodiazepine (Maryland Poison Center, Quebec antidote centre). A village will not have it, and oral B6 from food cannot approach these doses. *Inocybe* and *Clitocybe* give the SLUDGE picture in 15 minutes to 2 hours, resolving in 4 to 12 [VERIFY, primary series not reached]. But **atropine is contraindicated in *Amanita muscaria***, anticholinergic despite the name, and a village cannot separate the two reliably, so treat both with a dark quiet room and time. *Cortinarius* destroys the renal tubules after 3 to 20 days, with no antidote anywhere.

6. Plants: three ways to die, three nursing answers

The plant poisons sort by the organ they stop, and the nursing follows the group rather than the species, which is the simplification the book needs, because a village will often not know which plant it was.

The breathing stops. Coniine from *Conium maculatum*. The mind stays clear, which makes it terrible and also makes it nursable, and recovery is the norm if the airway is kept and the paralysis waited out. A 1991 Italian series of 18 patients, 17 of them coniine, found rhabdomyolysis in all 17 and acute renal failure in five [VERIFY, secondary summary]. That means **water, and plenty of it, after a hemlock survival**.

The heart stops or runs wild. Cardiac glycosides from *Digitalis*, *Nerium*, *Thevetia* and *Convallaria*, taxines from *Taxus*, and aconitine from *Aconitum*, a sodium-channel poison that looks the same to a villager. The only reliable reversal is digoxin-specific Fab: Eddleston and colleagues randomised 66 patients with serious arrhythmia after yellow oleander to 1,200 mg of Fab or saline, and the arrhythmia had resolved at two hours in 15 of the treated against 2 of the controls (Eddleston et al. 2000). That drug will not exist. What is left is to lie flat, keep absolutely still, keep warm, give no extra potassium, and wait, and BMJ Best Practice notes calcium salts should be avoided. Aconite's record is better than its reputation: a Hong Kong retrospective of 179 confirmed episodes from 2008 to 2020 found supportive treatment the mainstay and mortality of 1.1 per cent. Yew is the worst, with 20 of 48 published cases fatal, though only 4 were accidental.

The gut empties and the person dries out. Ricin from chewed *Ricinus communis*, *Chlorophyllum*, colchicine, and the early phase of amatoxin. Here the village is strongest, because the killer is hypovolaemia. A Maltese case of ten chewed castor beans recovered fully on rehydration and potassium, and a Hong Kong series who ate one to four seeds all resolved within two days with no deaths. Lethal-dose estimates run from about eight beans down to two or three, and they must be chewed, because swallowed whole they pass. **This group is treatable at the hearth, and the first failure will be a family that stops the fluid when the vomiting stops.**

7. Pesticides: atropine, and the belladonna question

Organophosphorus self-poisoning kills an estimated 200,000 people a year, with rural hospitals reporting 15 to 30 per cent case fatality (Eddleston et al. 2008). It will persist for as long as salvaged drums do.

The atropine regimen is the one protocol a healer must hold. From the Lancet review: 1 to 3 mg intravenously depending on severity. Five minutes later reassess pulse, blood pressure, pupils, sweat and chest sounds. If there is no improvement, **give double the previous dose**, and keep doubling every 5 minutes while there is no response, then stop doubling once the parameters improve. As much as 70 mg can be given in stages in under 30 minutes. Endpoints are a heart rate above 80, systolic pressure above 80 and a clear chest. Pupil dilation is not a useful early endpoint because of the lag. Maintenance is an hourly infusion of 10 to 20 per cent of the total stabilising dose. **Tachycardia is not a contraindication**, which is the error that kills, because a hypoxic patient's fast pulse is read as atropine

toxicity and the drug is withheld while the lungs fill. True toxicity is very dilated pupils, agitation, hyperthermia, absent bowel sounds and retention, answered by stopping for 30 to 60 minutes and restarting lower.

Respiratory failure is common and not confined to the first hours. In 376 confirmed Sri Lankan cases, 90 (24 per cent) needed intubation, 52 within two hours and 29 after 24 hours while conscious and without cholinergic features, some ventilated for up to six days (Eddleston et al. 2006). A village cannot intubate, but it can breathe for someone for six days if it organises relays. Decontamination here is skin, not stomach: a Sri Lankan randomised trial of over 1,000 patients found no benefit of charcoal in pesticide poisoning. Oximes age out and will not be made.

Can belladonna-derived atropine substitute? In principle yes, in practice this is the most dangerous idea in the report. Pharmacopoeial belladonna leaf is held at a minimum of 0.30 to 0.35 per cent total alkaloids (USP 35), while the natural plant ranges from 0.2 to 2.0 per cent in aerial parts and 0.2 to 1.2 in root (EMA CVMP), one Egyptian study found 2.88 per cent in wild leaf against 1.76 cultivated, and content peaks at bud formation. Atropine is the racemate of hyoscyamine and partly forms during extraction, so an assay reflects the process as much as the plant. The arithmetic is brutal: the regimen may need 70 mg in half an hour, and a tenfold uncertainty means either a tenth of the dose, which fails, or ten times, which is a delirious, hyperthermic patient with a stopped gut. **A crude belladonna tincture cannot be titrated against a dying patient.** Grow it, record it, leave standardisation to a district with a scale, and salvage real ampoules obsessively.

Paraquat. Reported mortality spans 21.8 per cent in a Thai cohort to 80 or 90 per cent in high-dose series, with pulmonary fibrosis the usual cause of death and no antidote. The counter-intuitive thing a village must know: a Taiwanese cohort of 416 patients found 87.8 per cent mortality with liberal oxygen against 73.7 without (p=0.007), and Queensland Ambulance lists paraquat with a saturation at or above 88 per cent as a contraindication to oxygen. **Do not give oxygen to a paraquat patient who is not visibly dying of hypoxia.**

8. The household drugs

Paracetamol. Hepatotoxicity follows a single ingestion above about **150 mg per kg**, rarely as low as 75. In a cohort of 784 cases no patient below 150 mg/kg developed hepatotoxicity, and the threshold was 92.6 per cent sensitive but 55.3 per cent specific. For a 70 kg adult that is 10.5 g, or 21 tablets of 500 mg, and for a 15 kg child 2.25 g, or four and a half. The trap is that the patient is well for 24 hours.

Acetylcysteine cannot be made. Oral methionine is the historical alternative and the most interesting stock item here, because it is a simple amino acid, orally active, cheap and very safe. The IPCS antidote monograph gives the adult regimen as **2.5 g (ten 250 mg tablets) every 4 hours to a total of 10 g over 12 hours**, within 15 hours of the overdose, with efficacy falling sharply after 10 and no paediatric dose given (Prescott, IPCS/CEC monograph). Prescott and colleagues in 1976 had 3 of 15 at-risk patients treated within 10 hours develop severe damage, all three dosed at 9 to 10 hours. Hamlyn and colleagues in 1981 found significant protection from oral methionine and from intravenous cysteamine, with no difference between them, and Prescott's observational comparison of 104 patients found liver damage in about 7 per cent on methionine against 2 on intravenous acetylcysteine, not significant. There are no randomised trials, and efficacy falls with vomiting or prior charcoal. **If a district infirmary can hold one antidote nobody thinks about, hold methionine.**

Opioids. Naloxone at 0.4 to 2 mg repeated every 2 to 3 minutes to about 10 mg, targeting a respiratory rate above 10, with a smaller 0.04 to 0.1 mg dose in the dependent (ACEP summary). Its duration is 20 to 90 minutes against a longer-lasting opioid, so re-sedation is the standing danger. None of this is makeable. The village version is Hesperian's and it is correct: **under 12 breaths a minute, breathe for them.** An opioid overdose is a self-limiting illness of a few hours, and a person who is breathed for wakes up.

Methanol and ethylene glycol. The one genuinely makeable antidote. Ethanol competes for alcohol dehydrogenase and stops the parent alcohol becoming formate or oxalate. Queensland's antidote sheet gives an oral loading

dose of **0.6 g per kg** with maintenance of 5 to 10 g an hour, targeting a blood alcohol of 0.1 to 0.2 g/dl, and a teaching resource gives the same load as 1.8 ml per kg of 43 per cent spirit with maintenance of 0.2 to 0.4 ml/kg/hour. Below 100 mg/dl it is ineffective, chronic drinkers need double maintenance, and without dialysis treatment runs for days. The stakes justify it: at Pärnu in Estonia in September 2001, illegal spirits of 50 to 100 per cent methanol produced 111 hospitalised patients and 68 deaths, about 23 per cent of those reaching hospital and 44 per cent of all verified cases, and of 86 survivors 20 had sequelae judged irreversible at six years (Paasma et al. 2009). The harm is specific: ethanol can cause profound hypoglycaemia in young children, and a 21-year review of 60 children found none symptomatically hypoglycaemic only because of monitoring and intravenous glucose. A village has neither. **In a child, ethanol is given only with sugar, by mouth, continuously, and someone stays awake with them.** Dosing goes by the clock and by keeping the patient visibly drunk but rousable.

9. Metals and gases

Lead. The slow poisoning a village will generate itself, from glazed pots, solder in salvaged tin, melted battery plates, bullets and old pipe. In a child: colic, constipation, pallor, irritability, loss of acquired skills, clumsiness, and in severe cases vomiting, altered consciousness and seizures from cerebral oedema. Encephalopathy occurs most often between 15 and 30 months and usually above a blood lead of 100 micrograms per decilitre, with symptomatic disease above 70 and occasionally as low as 50. Basophilic stippling is real but not specific.

Chelation is salvage-only and less useful than folklore makes it. The AAP recommends succimer at 45 to 70 micrograms per decilitre without encephalopathy (NYC DOHMH), and levels rebound as bone stores re-equilibrate. The Treatment of Lead-Exposed Children trial, randomising children at 20 to 44 micrograms per decilitre, found succimer lowered blood lead and produced **no detectable improvement in any measure of cognitive or behavioural function**, and the label itself says it is not indicated for prophylaxis in a lead-containing environment. **The treatment for lead is finding the source and destroying it**: no lead glaze on food vessels, no solder in a cooking pot, no battery smelting near a house. Vinegar does not chelate lead, and the belief is grade X, because acid food in a leaded pot leaches more lead.

Arsenic and mercury. Kosnett's review finds animal evidence supporting chelation for acute poisoning if started within minutes to a few hours, and recommends DMPS or DMSA over dimercaprol, which redistributes both metals to the brain (Kosnett 2013). For chronic arsenicosis it states efficacy is largely unestablished, and what works is arsenic-free water: for a village, a well and not a drug. Swallowed metallic mercury is poorly absorbed and usually harmless. The dangerous route is vapour, about 80 per cent absorbed by inhalation, and the exposure a village will create is heating amalgam to recover gold or silver, which causes a chemical pneumonitis and death from hypoxia. **Never heat amalgam indoors or over a cooking fire.**

Carbon monoxide. The one that will rise most sharply and is purely preventable. The German Federal Institute for Materials Research burnt 800 g of charcoal for two hours in a 19 cubic metre chamber, about the size of a living room, and measured 3,000 ppm, enough to cause unconsciousness within minutes, and notes the hazard persists with a garage door open. The half-life of carboxyhaemoglobin is about 4 to 6 hours on room air and 76 minutes on 100 per cent oxygen [VERIFY, secondary source]. A village has only room air, so everything rides on recognition: **several people in one room ill at once, with headache and nausea and no fever, is carbon monoxide until proved otherwise**, and the treatment is the door and the window. A salvaged pulse oximeter cannot tell carboxyhaemoglobin from oxyhaemoglobin and may read a dying patient as normal.

10. Cyanide, rodenticides, and the universal antidote

Cyanide from cassava and kernels. Sweet cassava roots hold under 50 mg of hydrogen cyanide equivalent per kilogram fresh weight, bitter varieties up to 400. The acute lethal dose of hydrogen cyanide is given as 0.5 to 3.5 mg per kg, and about 50 to 60 mg of free cyanide from cassava products as lethal for an adult man (FSANZ). The chronic

disease is konzo, an irreversible spastic paralysis of the legs in children and young women, appearing in drought when plants make more cyanogen and processing is cut short.

The processing is the medicine. Soaking roots 4 to 5 days is adequate in Central Africa and 1 to 2 days is not. Howard Bradbury's wetting method mixes flour with water, spreads it thin and lets the hydrogen cyanide escape, about 2 hours in sun or 5 in shade, then uses the flour the same day, cutting total cyanide 3 to 6-fold with no equipment and no extra water. In three Mozambican villages the share of at-risk children with high urinary thiocyanate fell from 52 per cent to 17, 4 and 0, on adoption by only 30 to 40 per cent of households (Banea et al.), and in a Congolese trial no new konzo cases occurred and mean flour cyanide fell from 50 to 14 ppm. Grade B and free. For acute cyanide the antidotes are hydroxocobalamin 5 g and sodium thiosulfate 12.5 g, neither of which will exist, and Hall, Dart and Bogdan concluded thiosulfate's onset is probably too slow to be the sole emergency antidote. Nitrites are worse than useless in a village because the methaemoglobinaemia they cause is fatal in a patient also carbon-monoxide poisoned, which is what a house fire produces. **The village answer is air and hand ventilation, with a cloth between the mouths, because the rescuer can be poisoned by the exhaled breath.**

Long-acting rodenticides. Brodifacoum's half-life is 16 to 36 days with reports of persistence to 270. Treatment is high-dose oral vitamin K1, typically up to 100 mg a day and often more, for weeks to months and sometimes over a year. In a Florida outbreak in December 2021 many patients needed 150 mg a day, thirty 5 mg tablets, for 3 to 6 months, and one case needed 800 mg a day. Can green leaves substitute? **No, and the arithmetic belongs in the book.** The richest measured source in an Australian survey of 90 commodities was kale at 565 micrograms per 100 g, so reaching 100 mg a day needs roughly **17.7 kilograms of kale a day**, for months, and leaf vitamin K is poorly and variably absorbed. Green leaves maintain normal clotting in a healthy person and will not reverse a superwarfarin. **Vitamin K1 is among the highest-value salvage items in any pharmacy.** Without it: rest, pressure on bleeding points, no injections into muscle, and fresh whole blood from a matched donor if the district can cross-match (THRIVING library, WO-13).

The universal antidote. *What the tradition says:* two parts charcoal, one part tannic acid, one part magnesium oxide, recommended in English, American and German medical literature and traceable to 1904, with charcoal to adsorb, tannin to precipitate alkaloids and magnesia to neutralise acids. The folk version is burnt toast, strong tea and milk of magnesia. *What the record shows:* experiments on mice found no significant detoxifying effect against alkaloids, insecticides, hypnotics, analgesics or arsenic, and in vitro work showed why: tannic acid is adsorbed onto the charcoal and the magnesium-tannin precipitate is adsorbed too, so the charcoal loses most of its binding capacity (Dtsch Med Wochenschr 1966). A 1970 review called the mixture more or less ineffective because the ingredients inactivate each other, and the AHFS reference states it is inferior to activated charcoal alone, tannic acid is potentially hepatotoxic, and there is no justification for its use. *What the inference is:* the three are chemically antagonistic, and the folk version is worse, because burnt toast has an order of magnitude less surface area. **Grade X.** The right answer is the one ingredient alone. The same verdict applies to silver blackening, cap peeling and the other folk tests graded X by PH-10, with which I agree.

Evidence grades

Measure	What the record shows	Grade
Breathing for a patient by hand, hours to days	Copenhagen 1952, snakebite and botulism series: survival without a ventilator	**B**
Oral rehydration solution in a poisoning diarrhoea	The commonest preventable death in amatoxin, ricin and colchicine is hypovolaemia	**A**

Measure	What the record shows	Grade
Single-dose activated charcoal within 1 h	47 per cent absorption reduction at 30 min falling to 21 at 180, no outcome trial. Hearth charcoal has a quarter to a fifth the surface area	**B** absorption, **D** outcome, **D** for hearth charcoal
Atropine doubling for organophosphate	Consensus, no optimal regimen established after 50 years	**B**
Belladonna-derived atropine titrated in a crisis	Content varies 0.2 to 2.0 per cent with season and handling	**D**, and dangerous
Ethanol for methanol or ethylene glycol	Mechanistically certain, used in the Estonian outbreak, no placebo trial	**B**
Oral methionine for paracetamol	3 of 15 damaged within 10 h (Prescott 1976), equal to cysteamine (Hamlyn 1981)	**B**
Silibinin or acetylcysteine for amatoxin	Enjalbert 5.4 against 47.3 per cent but uncontrolled, reviews call it unproven	**D**
Digoxin Fab for cardiac glycoside	Eddleston 2000 RCT, 15/34 against 2/32 resolved at 2 h	**A**, unavailable
Vitamin K1 for superwarfarin, and green leaves instead	Consistent case and outbreak series for K1. Leaves would need about 17.7 kg of kale a day	**B**, unavailable, and **X** for leaves
Succimer chelation for lead at 20 to 44 mcg/dl	TLC trial: blood lead fell, no cognitive benefit	**X** for cognition
Salt-water emesis	At least five documented deaths, sodium to 245 mmol/l	**X**
Ipecac, finger emesis and gastric lavage	No outcome benefit, delays antidotes, aspiration about 3 per cent, vagal arrest	**X**
Universal antidote, vinegar on lye, vinegar for lead	Ingredients inactivate each other, no effect in mice. Acid is exothermic on lye and leaches lead	**X**
Cooking to detoxify a doubtful plant	Amatoxin, colchicine, aconitine and glycosides are heat-stable	**X**
Oxygen in paraquat poisoning	87.8 against 73.7 per cent mortality in 416 patients	**X**

Means ledger

Rung	What it adds	What it changes
Hands and knowledge alone	Drag out of the gas. Recovery position. Count the breaths. Mouth-to-mouth through cloth. Note the hours. Refuse to induce vomiting. Keep the specimen	Converts the four reversible respiratory poisonings from fatal to survivable, at the cost of a sleepless household

Rung	What it adds	What it changes
The hearth	Oral rehydration solution by the litre. Sips after a solid caustic. Soap and water on contaminated skin. Shade and cool water for the anticholinergic. Ground hearth charcoal as a last resort	Turns the gut-emptying poisonings, which are most of them, from dangerous to usually survivable
Garden and still	**Ethanol by mouth at 0.6 g per kg for methanol and ethylene glycol.** Cultivated belladonna with a written harvest record. Cassava processing at scale. A copied bag and mask	The only rung that creates a genuine antidote from nothing. It saves the still's own victims
Village dispensary (300)	Salvaged activated charcoal, atropine, vitamin K1, methionine, diazepam, naloxone if any survives, a bag and mask. A written poison register. A ventilation rota board	Lowers organophosphate mortality where atropine exists and relays hold, and turns a rodenticide ingestion from a slow bleeding death into a nuisance
District infirmary (3,000)	Intravenous fluid. Cross-matched whole blood. A scale. Central antidote stock and rotation. Training the village healers	The ten beds matter less than the rota: ventilating three patients for six days takes about 36 person-shifts a day, and this is the rung where that is possible
A hospital before the Fall	Mechanical ventilation. Haemodialysis. Fab, naloxone, acetylcysteine, fomepizole, pralidoxime, silibinin, hydroxocobalamin, succimer, hyperbaric oxygen. Liver transplant	Amatoxin case fatality 10 to 27 per cent instead of near-total in severe cases. Methanol survivable with sight. Paraquat still untreatable, which is the measure of how bad paraquat is

Harm test

Activated charcoal kills by aspiration into an unprotected airway: a drowsy, fitting or vomiting patient, or a hydrocarbon or foaming product. If they cannot hold the cup and drink it themselves, they do not get it, and coughing, choking or a wet gurgling breath means stop, turn them on their side and sweep the mouth.

Salt-water emesis kills by hypernatraemic cerebral oedema at around 1 g per kg, with three Hamburg autopsies at sodium to 245 mmol/l among at least five recorded deaths. Never, in anyone, for any poison.

Atropine kills the unpoisoned by hyperthermia, delirium and ileus, and kills the poisoned by being withheld. Overdose shows as very dilated pupils, agitation, fever, a silent abdomen and retention, answered by stopping 30 to 60 minutes and restarting lower. Never in an anticholinergic poisoning, which includes *Amanita muscaria* and *Datura*. The commonest fatal error is withholding it because the pulse is fast.

Ethanol as antidote kills children by hypoglycaemia and anyone by aspiration. Never by mouth to the unconscious, the convulsing or the actively vomiting. In a child, with sugar and food, and someone stays awake. Without a blood level the margin between a therapeutic 100 mg/dl and a dangerous 300 is invisible, which is this antidote's honest limit.

Vitamin K1 is harmless orally at almost any dose, and the harm is stopping too early, because the brodifacoum outlasts the bleeding by months. **Chelation** harms by rebound, marrow and liver toxicity, and most of all by making everyone feel the problem is solved while the child goes home to the same glazed pot, and dimercaprol redistributes arsenic and mercury into the brain.

Breathing for a patient harms by over-inflation, which fills the stomach and causes vomiting and then aspiration. If the belly rises instead of the chest, use smaller squeezes and a slower rate, and turn the head.

Misidentification. Every herbal antidote here is one misidentification from a second poisoning. Belladonna is the one to fear, because PH-10 ranks *Atropa* berries as a child-killer and the root is stronger still. A village that cultivates it must fence it, label it and keep it out of the kitchen garden.

Red flags

1. **Vomiting beginning 6 or more hours after a wild mushroom meal.** Amatoxin. The village has oral rehydration and nothing else. Do it anyway, through the false recovery, for five days. Honest comfort: about three-quarters of hospital patients survive, and the hospital's contribution is largely fluid a family can also give.
2. **A burnt, ulcerating mouth after a herbicide.** Paraquat. Untreatable. No oxygen. Morphine if any exists. Say plainly that this takes days and is not survivable, and spend them on comfort.
3. **A *Cortinarius* eater with thirst and heavy urination at one to three weeks.** Irreversible renal failure. Water, salt and the truth.
4. **Deep gasping breathing and blindness after drinking spirits.** Methanol with established acidosis. Give ethanol anyway. Blindness with survival beats the alternative.
5. **A glycoside, aconite or yew patient with a chaotic pulse and falling pressure.** Needs Fab or pacing. Lie them flat, keep them still, and stay with them.
6. **A child with lead encephalopathy: vomiting, altered consciousness, fits.** Needs parenteral chelation and intensive care. Treat the fits, keep the airway, and destroy the source so the siblings live.
7. **Organophosphate poisoning with no atropine.** Washing, airway, and hand ventilation for up to six days. The one red flag a village can win, and it is won by the rota, not by medicine.

The case against

The strongest case against this chapter is that a one-page table is itself a hazard. A healer who has memorised twenty rows will reach for the wrong one under pressure. The critics who make this best are the authors of the decontamination position statements: Chyka and colleagues (2005), Höjer and colleagues (2013) and Benson and colleagues (2013) spent three papers removing interventions from practice, because teaching people to do something is not free and ipecac and lavage persisted for decades on plausibility and a table entry. The default in poisoning should be to do less and watch more.

The second is the belladonna question. A reader who finds "atropine can be made from belladonna" in a survival book will try it, and the content data say the attempt produces a useless tea or a poisoning. A fair critic would say naming it at all is irresponsible. I have kept it because silence leaves the reader to the internet, which does not carry the 0.2 to 2.0 per cent range.

The third comes from the other direction, the romance of the hospital. Everything here that works is nursing, which a village has in abundance and a hospital rations. Eddleston's own observation applies: after 50 years of use we still do not know how atropine, oximes and diazepam should best be given (Eddleston et al. 2008). If the core drugs of the world's commonest lethal poisoning are not optimised after half a century, a village without them is not as far behind as it feels.

The fourth is a disagreement with the library. PH-10 treats the 64-against-33 per cent boiled-versus-raw colchicum finding as established. I have set it out as a 32-patient retrospective series with a severe age confound

and a presumed mechanism, and would teach heat stability rather than the percentages. The conclusion stands. Its evidence is thinner than the number makes it look.

10-line summary

1. Almost nothing that saves a poisoned person is an antidote. It is airway, breathing, fluid and time, and a village has all four.
2. Nothing is ever given to make a poisoned person vomit. Salt water has a fatal dose near 1 g per kg and at least five recorded deaths.
3. Activated charcoal at 1 g per kg to 50 g, within the hour, only in someone awake enough to drink it unaided, never for alcohols, metals, corrosives or hydrocarbons.
4. Hearth charcoal has a quarter to a fifth of the surface area and is a weak last resort, never from a briquette.
5. Breathing for a patient by hand, in one-hour relays with a written rota, is the most valuable thing in this report. Given enough hands it cures hemlock, opioids and organophosphates.
6. Oral rehydration solution is the second. Most poisons that kill in a village kill by emptying the gut.
7. The one makeable antidote is ethanol at 0.6 g per kg for methanol and ethylene glycol, and in a child it needs sugar.
8. Atropine for organophosphate is doubled every 5 minutes until the chest is dry, the pulse is over 80 and the systolic pressure over 80. A fast pulse is not a reason to stop.
9. Nothing by mouth after lye, and never an acid to neutralise it. No oxygen to a paraquat patient who is not visibly hypoxic.
10. The universal antidote cancels itself out chemically and milk thistle is not the Amanita cure. Both are grade X or D, and both will be believed.

Open questions

- **Hearth charcoal in human poisoning.** No comparative study exists. The surface-area gap is measured, the clinical consequence only inferred.
- **Whether a standardised belladonna preparation is achievable at district scale.** I found no modern record of lay atropine dosing from a cultivated crop [VERIFY].
- **The colchicum boiling effect:** whether it is real, and whether age explains it.
- **Hand-ventilation endurance.** Copenhagen's figures are disputed in secondary accounts and Lassen's 1953 *Lancet* paper could not be obtained (THRIVING library, IN-16). How many people a village of 300 can sustain on hand ventilation, and for how long, is the most important question left open.

Sources to read in full

1. **Eddleston M, Buckley NA, Eyer P, Dawson AH. Management of acute organophosphorus pesticide poisoning. *Lancet* 2008.** The atropine regimen, written for a hospital without enough of anything.
2. **Chyka PA et al. Position paper: single-dose activated charcoal. *Clinical Toxicology* 2005.** The numbers behind the one-hour rule.
3. **Höjer J et al. on ipecac, and Benson BE et al. on gastric lavage, *Clinical Toxicology* 2013.** Two short papers that remove most of what old manuals tell a village to do.
4. **Prescott LF, IPCS/CEC antidote monograph on paracetamol antidotes.** The methionine regimen and the efficacy series in one place.
5. **Enjalbert F et al. Treatment of amatoxin poisoning: 20-year retrospective analysis. 2002.** Toxicology's clearest example of a huge apparent effect from an uncontrolled comparison.
6. **Hesperian, *New Where There Is No Doctor*, Poison.** The best village-level writing on the subject, read with the emesis advice struck out.

7. **Banea JP, Bradbury JH et al. on the wetting method for cassava flour, and Paasma R, Hovda KE, Jacobsen D, Methanol poisoning and long term sequelae, 2009.** A household technology with a measured public-health effect, and what a methanol outbreak does to a region.

At the bedside after the Fall

A household. Four sentences inside a cupboard door: *Fresh air and open doors. Do not make them vomit. Count the breaths and breathe for them under 12. Salt and sugar water, a cup every time they are sick.* It needs salt, sugar, clean water, a clean cloth, and one skill, mouth-to-mouth through cloth, which takes ten minutes to teach. The record is one line: what, when, how much, and when symptoms started. The first failure to expect is that the household gives something by mouth to an unconscious person, because doing nothing feels like abandonment.

A village of 300. Add a lay healer, a locked poison cupboard and a rota board. The cupboard holds, in order of value: activated charcoal, oral rehydration salts in bulk, atropine, vitamin K1, diazepam, methionine, naloxone if any survives, and a self-inflating bag with two mask sizes. It needs a register with one line per poisoning, so that in five years the village knows which poisons it actually meets, and the table on a wall rather than in a book. The skill drilled quarterly is the ventilation relay. The first failure to expect is the second night of a six-day ventilation, when the relay collapses because nobody wrote down who was next.

A district of 3,000. Add a nurse, intravenous fluid, cross-matched whole blood, a scale, and the authority to hold antidote stock centrally and rotate it. Add a fenced, labelled belladonna bed with a written harvest record, as a twenty-year project and not a crisis resource, and the teaching function: the district trains the village healers and collects their registers. The first failure to expect is that the district hoards salvaged antidotes until they expire, because sending them out feels like losing them.

Protocols

Protocol 1. The first ten minutes, any poisoning

1. Is the air safe? For a gas or fume, do not enter. Open everything from outside. If you must enter, someone holds your ankles.
2. Are they breathing? Count for 15 seconds and multiply by four. **Under 12 a minute in an adult, or any gasping, means Protocol 2 now.**
3. If they are not fully awake, turn them on their side, head slightly down, mouth open.
4. Write down the hour they ate or drank, the hour the first symptom appeared, how much, and who else shared it. Find all of them, including those who feel well.
5. Keep the jar, the leftover plant and the vomit, labelled, for 72 hours after the last person eats (THRIVING library, PH-10).
6. **Do not make them vomit.** No salt, no finger, no mustard, no ipecac.
7. Strip and wash contaminated skin with soap and water, gloved or with hands inside a bag, then wash your own.
8. Nothing by mouth if they are drowsy, fitting, drooling or have burnt lips. After a caustic: wipe and rinse the mouth, sips only in the first minutes and only if fully awake, then nothing by mouth, sitting upright. Expect the gullet to narrow over weeks in a survivor.

Protocol 2. Breathing for a patient, hours to days

1. Clear the mouth with a hooked finger or cloth. Tilt the head back and lift the jaw.
2. **10 breaths a minute for an adult, 20 to 30 for an infant or child.** One breath every 6 seconds for an adult: “one and two and three and four and five and breathe”.
3. Watch the chest, not the bag. **It should rise just visibly, no more.** If the belly rises, the head is not tilted enough or you are blowing too hard.

4. With a salvaged bag, squeeze about half of it with one hand: a mean of 808 ml has been measured where 500 to 600 was intended.
5. Mouth-to-mouth goes through a thin cloth, which costs little oxygen and protects the rescuer, absolutely so in cyanide and organophosphate.
6. Feel for a neck pulse every few minutes, and keep going while it is there. Ask them to move a finger.
7. **Relays of one hour. Two people awake at all times. A written handover at every change: time, who, breaths a minute, whether the chest rose, anything vomited.**
8. Turn the patient every two hours. Keep the eyes closed and moist. Nothing by mouth. Expect up to six days in organophosphate poisoning.

Protocol 3. Activated charcoal

1. Only if they swallowed it within the last hour, are fully awake, and can hold a cup and drink unaided.
2. Not for alcohols including methanol and ethylene glycol, metals including iron, corrosives, hydrocarbons including kerosene and petrol, or any foaming product.
3. Dose **1 g per kilogram, maximum 50 g**: under 1 year 1 g/kg, ages 1 to 12 25 g, over 12 and adults 50 g.
4. Mix in roughly 8 times its volume of clean water to a thin slurry. Honey or juice helps a child drink it.
5. Give over 15 to 20 minutes, stopping at once for coughing, choking or drowsiness.
6. Hearth charcoal only if nothing else exists: hardwood, never a briquette, ground as fine as flour, double the volume, same rules, much lower expectations.

Protocol 4. Ethanol for methanol or ethylene glycol

1. Suspect it in anyone who drank unlabelled spirits or anything sweet from a workshop, and in anyone drunk who gets worse rather than better after some hours.
2. Give it early, without waiting for symptoms. It only works before the metabolite forms.
3. Loading dose by mouth: **0.6 g of ethanol per kg.** With 40 per cent spirit that is about **1.9 ml per kg**, roughly 130 ml for a 70 kg adult.
4. Maintenance about 5 to 10 g an hour for an adult, roughly 15 to 30 ml of 40 per cent spirit hourly, doubled in a habitual drinker.
5. Target: visibly and continuously drunk, rousable, able to protect their own airway, for days. If unrousable, stop and breathe for them.
6. **In a child: sugar with every dose, food if they can eat, and someone awake beside them all night.**
7. Dilute with water or juice. Nothing by mouth if vomiting, fitting or unconscious.

Protocol 5. Organophosphate poisoning where atropine exists

1. Gloves. Strip the clothes, bag them, wash the skin with soap and water.
2. Clear the airway, swab with a cloth, turn on the side, and breathe for them if needed (Protocol 2).
3. Atropine **1 to 3 mg intravenously**, 1 for mild and 3 for severe.
4. **Wait 5 minutes.** Check pulse, blood pressure, chest sounds, sweating, pupils.
5. If not improved, **give double the last dose**, repeating the 5-minute cycle and doubling each time, until the chest is clear and the heart rate and systolic pressure are both above 80. Up to 70 mg in under 30 minutes is within the record.
6. Do not stop for a fast pulse, and do not use pupil size as the early endpoint.
7. Maintenance about 10 to 20 per cent of the total stabilising dose each hour.
8. Watch for atropine toxicity: very wide pupils, agitation, fever, silent abdomen, no urine. Stop 30 to 60 minutes and restart lower.
9. Expect a second crisis at 24 to 96 hours in a conscious patient who then cannot breathe. Watch for five days.

Protocol 6. Oral rehydration through a poisoning diarrhoea

1. **1 litre of clean water, 6 level teaspoons of sugar, half a level teaspoon of salt** (THRIVING library, PH-10).
2. A cup after every loose stool or vomit for an adult, a quarter to half a cup for a child. If vomited, wait 10 minutes and give it by spoon in sips.
3. Measure what goes in and what comes out, with the time. That record says whether you are winning.
4. Losing: no urine for 8 hours, sunken eyes, skin that stays pinched, a resting pulse over 120, confusion. Those need intravenous fluid at the district.
5. Continue through the apparent recovery on day 2 or 3 of an amatoxin case. It is false.

Numbers to carry

1. **12 breaths a minute.** Below that, breathe for them: 10 a minute for an adult, 20 to 30 for a child, chest just visibly rising.
2. **1 gram per kilogram, 50 g maximum, within 1 hour.** Activated charcoal, only in someone who can drink it unaided.
3. **1 gram of salt per kilogram is a lethal dose.** Never induce vomiting with salt. Never induce vomiting at all.
4. **150 milligrams per kilogram.** The paracetamol line: about 21 tablets of 500 mg in an adult, about four and a half in a 15 kg child.
5. **0.6 grams per kilogram.** Ethanol loading dose for methanol or ethylene glycol, about 1.9 ml of 40 per cent spirit per kilogram.
6. **Double every 5 minutes.** Atropine in organophosphate poisoning, until the chest is clear and the pulse and systolic pressure are both over 80.
7. **1 litre, 6 teaspoons of sugar, half a teaspoon of salt.** Oral rehydration solution.
8. **6 days.** How long an organophosphate patient may need to be breathed for. The rota is the medicine.
9. **17.7 kilograms of kale a day.** What replacing 100 mg of vitamin K1 would take. Leaves do not treat a rodenticide bleed.
10. **Nothing by mouth after lye.**

References

1. Chyka PA, Seger D, Krenzelok EP, Vale JA. Position paper: single-dose activated charcoal. *Clinical Toxicology* 2005, 43(2):61-87. https://pubmed.ncbi.nlm.nih.gov/15822758/ (abstract and secondary summaries read, full paper not reached)
2. Höjer J, Troutman WG, Hoppu K et al. Position paper update: ipecac syrup for gastrointestinal decontamination. *Clinical Toxicology* 2013, 51(3):134-139. https://www.clintox.org/wp-content/uploads/2016/04/Position-Statement-Ipecac-Syrup-1.pdf (abstract and secondary summaries read)
3. Benson BE, Hoppu K, Troutman WG et al. Position paper update: gastric lavage for gastrointestinal decontamination. *Clinical Toxicology* 2013, 51(3):140-146. https://www.clintox.org/wp-content/uploads/2016/04/Gastric-Lavage-2013.pdf (abstract and secondary summaries read)
4. Eddleston M, Buckley NA, Eyer P, Dawson AH. Management of acute organophosphorus pesticide poisoning. *Lancet* 2008, 371(9612):597-607. https://pmc.ncbi.nlm.nih.gov/articles/PMC2493390/ (author manuscript read)
5. Eddleston M, Mohamed F, Davies JOJ et al. Respiratory failure in acute organophosphorus pesticide self-poisoning. *QJM* 2006, 99:513-522. https://pmc.ncbi.nlm.nih.gov/articles/PMC1525210 (secondary summary read)

6. Hesperian Health Guides. *New Where There Is No Doctor*, Poison. https://en.hesperian.org/hhg/New_Where_There_Is_No_Doctor:Poison (read)
7. Hesperian Health Guides. *New Where There Is No Doctor*, Medicines for Poisoning: First Aid. https://en.hesperian.org/hhg/New_Where_There_Is_No_Doctor:Medicines_for_Poisoning:_First_Aid (secondary summary read)
8. Prescott LF (overview author). Antidotes for paracetamol poisoning: methionine and N-acetylcysteine. IPCS/CEC Evaluation of Antidotes Series. INCHEM. https://www.inchem.org/documents/antidote/antidote/ant03.htm (first part read)
9. Türk EE, Schulz F, Koops E, Gehl A, Tsokos M. Fatal hypernatraemia after using salt as an emetic. *Legal Medicine* 2005. https://oadoi.org/10.1016/j.legalmed.2004.06.005 (secondary summary only)
10. Fatal hypernatraemia after saltwater emesis in an adolescent, case report. *Clinical Toxicology.* https://informahealthcare.com/doi/abs/10.1081/CLT-120025352 (abstract page, secondary summary only)
11. Hypernatremia caused by saltwater emesis in a case of neem powder poisoning. *Cureus* 2025. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC12417294/ (secondary summary only)
12. Médecins Sans Frontières. Activated charcoal, oral. *MSF Essential Drugs.* https://medicalguidelines.msf.org/en/viewport/EssDr/english/activated-charcoal-oral-16683292.html (secondary summary read)
13. Carbosorb X suspension datasheet, Medsafe New Zealand. https://www.Medsafe.govt.nz/profs/Datasheet/c/CarbosorbXsusp (secondary summary only)
14. Centre antipoison du Québec. Xenobiotics for which activated charcoal is not or very rarely recommended. https://www.ciusss-capitalenationale.gouv.qc.ca/sites/d8/files/Microsites/CAPQ/Antidotes/Xenobiotics%20or%20other%20 (secondary summary only)
15. Asada T et al. Comparison of bamboo and cedar charcoals and activated carbons: surface area, iodine number and adsorption. Kyushu University repository. https://catalog.lib.kyushu-u.ac.jp/opac_download_md/1434400/p117.pdf (secondary summary only)
16. WikEM. Alkali ingestion. https://wikem.org/wiki/Alkali_Ingestion (secondary summary read)
17. Merck Manual Professional. Caustic ingestion. https://www.merckmanuals.com/professional/injuries-poisoning/poisoning/caustic-ingestion (secondary summary read)
18. Enjalbert F, Rapior S, Nouguier-Soulé J et al. Treatment of amatoxin poisoning: 20-year retrospective analysis. *J Toxicol Clin Toxicol* 2002, 40:715-757, appraised in BestBets. https://bestbets.org/bets/bet.php?id=2778 (secondary appraisal read, primary not reached)
19. Ganzert M, Felgenhauer N, Schuster T et al. Amanita poisoning: silibinin compared with silibinin plus penicillin. *Dtsch Med Wochenschr* 2008, 133(44):2261-2267. https://www.thieme-connect.com/products/ejournals/pdf/10.1055/s-0028-1091268.pdf (secondary summary only)
20. Acute Liver Failure Study Group. Acute liver injury and acute liver failure from mushroom poisoning in North America. *Liver International* 2016. https://pubmed.ncbi.nlm.nih.gov/26837055/ (secondary summary only)
21. Acetylcysteine as a treatment for amatoxin poisoning: a systematic review. *Clinical Toxicology* 2021. https://nutrition-evidence.com/article/353664/acetylcysteine-as-a-treatment-for-amatoxin-poisoning-a-systematic-review (secondary summary only)
22. Maryland Poison Center. Pyridoxine antidote facts. https://mdpoison.com/media/SOP/mdpoisoncom/healthcareprofessiona facts/Pyridoxine%20Antidote%20Facts.pdf (secondary summary read)
23. Centre antipoison du Québec. Pyridoxine. https://www.ciusss-capitalenationale.gouv.qc.ca/en/antidotes/pyridoxine (secondary summary only)
24. WikEM. Mushroom toxicity. https://wikem.org/wiki/Mushroom_toxicity (secondary summary read, source of the 14-patient *Inocybe* figure [VERIFY])
25. Retrospective series of 32 patients poisoned by *Colchicum autumnale* taken for wild garlic, with

the boiled-versus-raw comparison and the 9-hour latency finding. *Zdravniški Vestnik* 2004. https://doaj.org/article/b9ccb4919c3c47ffb0269984848de18c (abstract and secondary summary only, authorship not confirmed [VERIFY])

26. Brvar M et al. Acute poisoning with autumn crocus (*Colchicum autumnale* L.). *Wiener Klinische Wochenschrift* 2004. https://pubmed.ncbi.nlm.nih.gov/15088997/ (abstract only)
27. Eddleston M, Rajapakse S, Rajakanthan et al. Anti-digoxin Fab fragments in cardiotoxicity induced by ingestion of yellow oleander: a randomised controlled trial. *Lancet* 2000. https://archive.cmb.ac.lk/items/d5aeedd7-75fd-4b71-817f-11f63b1206e8 (secondary summary read)
28. de Silva HA et al. Multiple-dose activated charcoal for treatment of yellow oleander poisoning: a randomised, placebo-controlled trial. *Lancet* 2003, 361:1935-1938. https://archive.cmb.ac.lk/items/5881023e-0edd-4214-8ae6-bbb3bf634fa9 (secondary summary only)
29. BMJ Best Practice. Digoxin toxicity, management approach. https://bestpractice.bmj.com/topics/en-us/338/management-approach (secondary summary read)
30. BestBets. In digoxin-induced life-threatening ventricular dysrhythmia, what pharmacotherapy other than Fab should be implemented? https://bestbets.org/bets/bet.php?id=1578 (secondary summary read)
31. Clinical toxicology of yew poisoning: systematic review of published cases. https://read.qxmd.com/read/29363354/clinical-toxicology-of-yew-poisoning (secondary summary only)
32. Chan TYK and Hong Kong poison centre series on aconite poisoning. *Hong Kong Medical Journal.* https://www.hkmj.org/system/files/hkm0612p456.pdf (secondary summary read). The territory-wide 2008 to 2020 series of 179 episodes with 1.1 per cent mortality is cited through a secondary summary [VERIFY, primary not reached]
33. Acute *Datura stramonium* poisoning in the east of Iran: a case series. *Avicenna Journal of Phytomedicine* 2012. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4075664/ (secondary summary read)
34. BestBets. Use of physostigmine in patients presenting with anticholinergic poisoning. https://bestbets.org/bets/bet.php?id=2864 (secondary summary read)
35. Castor bean ingestion, case report and review, Malta. https://www.um.edu.mt/library/oar/bitstream/123456789/561/1/2004 (secondary summary only)
36. Plant ingestion case series, Hong Kong emergency departments. *Hong Kong Journal of Emergency Medicine* 2019. https://journals.sagepub.com/doi/10.1177/1024907919846720 (secondary summary only)
37. Hemlock poisoning case reports and the Italian series of 18 patients with rhabdomyolysis. https://pmc.ncbi.nlm.nih.gov/articles/PMC4909876/ (secondary summary only, primary 1991 series not reached [VERIFY])
38. Queensland Poisons Information Centre. Ethanol antidote stocking recommendations. https://www.poisonsinfo.health.qld.gov.au/for-health-professionals/antidote-stocking-recommendations/ethanol (secondary summary read)
39. Austin Health. Ethanol antidote guideline, February 2023. https://austin.org.au/Assets/Files/Ethanol%20antidote%20Guidel (secondary summary read)
40. Paasma R, Hovda KE, Jacobsen D. Methanol poisoning and long term sequelae: a six years follow-up after a large methanol outbreak. *BMC Clinical Pharmacology* 2009, 9:5. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2667428/ (secondary summary read)
41. ACEP Now. A unified naloxone guideline graph. https://acepnow.com/article/a-unified-naloxone-guideline-graph (secondary summary read)
42. Cohort study of the 150 mg/kg paracetamol threshold against the treatment line. *BMC Pharmacology and Toxicology* 2022. https://doaj.org/article/4ab42b44633d4e9690a3d31cf1a734e7 (secondary summary only)
43. Kosnett MJ. The role of chelation in the treatment of arsenic and mercury poisoning. *Journal of Medical Toxicology* 2013. https://pubmed.ncbi.nlm.nih.gov/24178900/ (secondary summary read)
44. New York City Department of Health and Mental Hygiene. Lead chelation guidance for clinicians. https://www.nyc.gov/assets/doh/downloads/pdf/lead/lead-chelation.pdf (secondary summary read)

45. Succimer monograph, including the Treatment of Lead-Exposed Children trial result. https://drugs.com/monograph/succimer.html (secondary summary read)
46. StatPearls. Mercury toxicity. https://www.ncbi.nlm.nih.gov/books/NBK499935/ (secondary summary read)
47. Bundesinstitut für Risikobewertung. Charcoal grills should not be used indoors, press release. https://www.bfr.bund.de/en/press-release/charcoal-grills-should-not-be-used-indoors/ (secondary summary read)
48. Nosal DG, Feinstein DL, Chen L et al. Brodifacoum pharmacokinetics in acute human poisoning: implications for estimating duration of vitamin K therapy. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7990043/ (secondary summary read)
49. Notes from the field: coagulopathy associated with brodifacoum poisoning, Florida, December 2021. *MMWR*. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9541027/ (secondary summary read)
50. Association between liberal oxygen therapy and mortality in paraquat poisoning, 416 patients, Taiwan. https://pure.lib.cgu.edu.tw/en/publications/association-between-liberal-oxygen-therapy-and-mortality-in-patie/ (secondary summary only)
51. Fatal paraquat poisoning: a case report and literature review. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC11981316/ (secondary summary read)
52. Banea JP, Bradbury JH et al. Use of the wetting method on cassava flour in three konzo villages in Mozambique. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4930499/ (secondary summary read)
53. Food Standards Australia New Zealand. Cyanogenic glycosides in cassava and bamboo shoots. https://www.foodstandards.gov.au/sites/default/files/publications/Documents/Cyanogenic%20glycosides.doc (secondary summary only)
54. Hall AH, Dart R, Bogdan G. Sodium thiosulfate or hydroxocobalamin for the empiric treatment of cyanide poisoning? *Annals of Emergency Medicine* 2007. https://ncbi.nlm.nih.gov/pubmed/17098327 (secondary summary only)
55. Vitamin K content of Australian-grown horticultural commodities, 2024. https://arxiv.org/abs/2401.07473v1 (secondary summary read)
56. Siegler J et al. It's in the bag: tidal volumes in adult and pediatric bag valve masks. *Western Journal of Emergency Medicine* 2020. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7234703/ (secondary summary read)
57. European Medicines Agency, Committee for Veterinary Medicinal Products. *Atropa belladonna* summary report. https://www.ema.europa.eu/documents/mrl-report/atropa-belladonna-summary-report-committee-veterinary-medicinal-products_en.pdf (secondary summary read)
58. United States Pharmacopeia 35, belladonna leaf monograph. https://www.drugfuture.com/Pharmacopoeia/USP35/data/v35 (secondary summary read)
59. The universal antidote (charcoal, tannic acid, magnesium oxide): experimental evaluation. *Deutsche Medizinische Wochenschrift* 1966, 91(50):2241-2248. https://www.thieme-connect.com/products/ejournals/pdf/10.1055/s-0028-1111679.pdf (secondary summary only, German original not read)
60. Chen Y et al. Global burden of unintentional poisoning, analysis of WHO and GBD estimates. *BMJ Open* 2023, 13:e062744. https://bmjopen.bmj.com/content/13/2/e062744.full.pdf (secondary summary read)
61. Global, regional and national burden of unintentional childhood poisoning, 1990 to 2021. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC12361209/ (secondary summary read)
62. THRIVING library, PH-10. The deadly lookalikes: a field identification safety guide for medicinal plants.
63. THRIVING library, WO-13. Bites, stings and envenomation: snakes, dogs, insects and rabies.
64. THRIVING library, IN-16. Zoonoses, food poisoning and the animals we live with.