ME-05 Opium poppy, morphine and pain: cultivation, preparation, dose, dependence and the ethics

HEALING after the FALL, research library, ME-05

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

How to read this report

By the owner's ruling of 12 October 2026, this report covers poppy cultivation and the simple traditional preparations the record describes, with dose, dependence, overdose and the ethics. It carries no morphine extraction, isolation or purification and no reagent quantities. On extraction it says only who did it, under what conditions, and why a village cannot.

It builds on ME-02 (potency and titration), WO-11 (wound doses, the tincture and paregoric trap, poppy-seed tea, naloxone dilution), ME-14 (rescue breathing) and FO-05 (Godfrey's Cordial and the 1868 Act), and does not repeat them. Several leads in the brief were loose and are corrected where they arise. The policy on growing, locking and dispensing is marked [OWNER] and is not a research finding.

1. The plant, its lookalikes and its cultivation

Identity. *Papaver somniferum* L. is an annual of the Papaveraceae. The part used is the latex of the unripe capsule, which dried is opium. The dried ripe capsule with its upper stalk is poppy straw. The seed carries no alkaloid of its own but is contaminated from the capsule surface (THRIVING library, WO-11). The plant is glaucous (blue-grey with a waxy bloom), glabrous or sparsely bristly, with upper leaves clasping the stem and a smooth globular capsule up to about 9 cm, crowned by a flat disc of 5 to 18 stigmatic rays (VicFlora 2024). Flower colour, white to pink, red or purple, says nothing about alkaloid content.

Lookalikes. None is a deadly poison. The danger runs the other way. - *P. somniferum* subsp. *setigerum*, the bristly wild Mediterranean form, has bristly sepals and stalks, a smaller capsule and is reported low in morphine (Liu and others 2020, search summary). - *P. rhoeas*, the corn poppy, is hairy throughout, with divided leaves that do not clasp the stem and a small capsule of negligible morphine (VicFlora 2024). This supports WO-11's mark [VERIFY] on the point. - *P. bracteatum*, a perennial, carries thebaine rather than morphine. I found no field key separating it from the cultivated plant [VERIFY].

The real misidentification is believing the garden "ornamental" is not an opium poppy. Thirty-four dried ornamental capsules from Estonian vendors and gardens averaged 362 mg morphine per 100 g, range 152 to 676 (Proceedings of the Estonian Academy of Sciences 2017, search summary). The ornamental is the drug plant.

Climate and season. FAO gives a cycle of 135 to 170 days as a subtropical winter crop (sown in autumn, as in India and Afghanistan) and 150 to 210 days as a temperate summer crop. The stages are germination 15 to 20 days, rosette 50 to 60, stem elongation 25 to 30, flowering and seed set 20 to 30, and ripening 15 to 25. Seedlings survive about

minus 5°C. The crop dislikes wind and rain at harvest, and FAO advises no more than 3 to 5 years on one field (FAO EcoCrop). Polish spring poppy runs 125 to 140 days, survives ground frost to about minus 8°C and is sown in late March (Acta Agrobotanica 2011, search summary). Afghans broadcast seed in October and November, or in March above about 5,000 feet, and the crop matures in four to five months (CIA 1972, search summary). The brief's "90 to 120 days to capsule" fits sowing to flowering, by my sum of the FAO stages [VERIFY].

Sowing. An Indian trial sowed on 10 November in rows 30 cm apart at about 300,000 plants per hectare, and found late sowing and dense planting lowered both yield and morphine (Journal of Agricultural Science, abstract). European seed rates convert to about 0.5 to 1.5 kg per hectare, or 5 to 15 g for 100 square metres (my conversion [VERIFY]).

Lancing. The brief says 10 to 14 days after petal fall. The sources give a window: - Afghan lancing began about two weeks after petal fall, up to five vertical cuts per capsule (CIA 1972, search summary). - Pakistani capsules were lanced in the afternoon on about eight successive days, with morphine and codeine peaking in the third lancing (PJSIR 1968, scan unreadable, search summary only). - Indian licensed farmers lance in February and March in the late afternoon and scrape the next morning, three or four lancings per capsule (Global Agriculture, India calendar). - Green-capsule morphine concentration peaked 5 to 7 days after flowering (Tookey and others 1975, search summary), and latex capacity is fixed by about a week after flowering (University of Tasmania, search summary).

The reconciling field rule is to start test cuts about a week after the petals drop and lance when the capsule is firm and paling from dark green, then every second day until the latex stops. Cuts are shallow, since a cut through the wall spoils the seed [VERIFY, no primary agronomy text read].

Yield. The brief's 10 to 20 kg per hectare is too low. UNODC national averages for Afghanistan, in kg of opium per hectare (UNODC 2022, UN News 2022, search summaries):

Year	2009	2010	2011	2014	2015	2016	2017	2020	2021	2022
kg/ha	56.1	29.2	44.5	28.7	18.3	23.8	27.3	28.0	38.5	26.7

After the Taliban ban, cultivation fell about 95 per cent to 10,800 ha in 2023 (later UNODC survey summaries [VERIFY]). India averaged 20.12 kg per hectare in 1953-54 and 30.60 in 1963-64 (UNODC Bulletin 1966, search summary). Licensed farmers had to deliver at least 53 kg per hectare in Madhya Pradesh and Rajasthan and 47 in Uttar Pradesh in 2002-03, and 56 and 52 in 2015-16. For 2025-26 the licence is set at 4.2 kg of morphine per hectare (Tribune India 2025). Indian weights are at 70 degrees consistency, 70 per cent solids, not dry (Wikipedia, Legal opium production in India, search summary). An experimental crop gave 5.4 to 6.7 kg of morphine per hectare (Tookey and others 1975).

What a plot gives. A 10 by 10 metre plot at 20 to 55 kg per hectare gives about 0.2 to 0.55 kg of opium, which at 10 per cent is 20 to 55 g of morphine, or 2,000 to 5,500 doses of 10 mg. A first-year grower should expect the low end (my arithmetic [VERIFY]). MSF's worked example of a dying patient on 90 mg a day uses 2.7 g a month (MSF Essential Drugs), so one good plot is roughly 7 to 20 patient-months of strong relief. I found no labour figure in person-days per hectare.

2. What is in opium, and why no two batches match

Normal unadulterated opium is 8 to 19 per cent morphine (UNODC 1953) and 98 Indian germplasm lines ranged 9.20 to 20.86 per cent (both via THRIVING library, ME-02). A compiled table gives an outer 2.8 to 23 per cent (TripSit, secondary, low weight). The minor alkaloids are narcotine 5 to 7 per cent, codeine 1 to 2, papaverine 0.4 to 1 and thebaine 0.2 to 0.5 (Nature 1937, search summary), among at least 25 (IARC 2021, search summary). The US

pharmacopoeia requires raw opium of at least 10 per cent morphine and India rejects licit opium below 9 per cent dry or above 4.5 per cent ash (Wikipedia, Legal opium production in India).

So opium itself varies about two-fold in normal practice and eight-fold at the extremes. The brief's twenty-fold range belongs to the rest of the plant: capsule tissue 0.02 to 1.05 per cent (PJSIR 1968 via ME-02), Estonian ornamental capsules 0.15 to 0.68, Czech straw cultivars 0.61 to 0.79 with 'Buddha' at 1.64 (Plant, Soil and Environment 2011, search summary), industrial straw at least 0.8 and Australian crops 1 to 3 (Wikipedia, Poppy straw, search summary), and seed from under 1 to 2,788 mg per kg (THRIVING library, WO-11). The brief's straw figure of 0.2 to 0.5 per cent is the low end only. Poppy-head tea is the least dosable form of the drug, and unwashed seed tea is worse. Later lancings, wet drying, evaporation and adulteration add to the plant's variation (THRIVING library, ME-02).

3. The traditions on their own terms

Rajasthan: amal and manuhar. Among Rajput and other communities of western Rajasthan, opium is *amal*, a substance of hospitality, oath and bond. A host pours *amal* dissolved in water into the cupped palm of his guest, and the drinking is the welcome. The ICMR Bulletin of 2008 describes this, the ritual liquid *kasumba*, and opium's place in sealing agreements, at marriages and betrothals, and in the region's idea of endurance and long life (ICMR 2008). The Komal Kothari collection, digitised by the British Library, photographs the ritual *Amal ki Manuhar*, the offering of opium (British Library EAP1153, search summary). A press account describes *amal* ground in water in a wooden vessel and strained, and a 2008 petition under the narcotics law in Barmer district after a former Union minister's gathering, at which he and his guests denied the drink contained opium (Outlook India, search summary). Poppy husk, *doda*, is drunk in the same region, which the ICMR authors tie to climate and hard labour, as self-medication for pain, fatigue and distress woven into the social fabric. Beside this, the same bulletin records that children were given opium in sweets, that it was used to kill newborn girls, and that dependence is common (ICMR 2008).

Ayurveda and Unani. In Ayurveda opium is *ahiphena*, entering the materia medica in medieval texts, the *Sharangadhar Samhita* and the *Bhavaprakash*, and appearing in at least eight classical preparations including *Ahiphenasava*. The tradition's emphasis is not pain: the ICMR authors note that Hindu physicians made little use of its sedative and analgesic powers, and trained practitioners now use it rarely, mainly for diarrhoea and dysentery. Unani (Tibbi) medicine, from Arabic and Persian medicine, used it for pain, cough, catarrh, asthma, hiccup, diarrhoea and dysentery (ICMR 2008). In both, opium is a strong drug given by a physician in small amounts inside a compound, which is how the tradition holds its danger. I found no Ayurvedic or Unani dose of *ahiphena* in a source I could read.

Laos: the household poppy. Joseph Westermeyer, a psychiatrist working in Laos from the 1960s, describes opium among Hmong, Lao and other peoples as the household medicine for pain, cough, diarrhoea and the ailments of age, used by many elders for years without escalation (Westermeyer 1983, review, search summary). His survey of ten communities in 1972 to 1974 found addicts per 100 people of 7.0 to 9.8 in poppy-growing villages, 4.1 to 5.5 in opium-trading villages and 1.8 to 2.3 in villages that did neither (Westermeyer 1979, abstract). Availability multiplied addiction three- to four-fold, the most important number in this report for a village deciding whether to grow.

England: Sydenham and the house recipe. Thomas Sydenham's laudanum of 1669 was a wine of opium with saffron, cinnamon and cloves. Secondary accounts give about 2 oz opium and 1 oz saffron in a pint or a pound of Spanish wine and disagree on the spices (General Anaesthesia history page, Science Museum Group, both search summary). Lady Ann Fanshawe's manuscript records 2 oz of opium in a pint of Canary wine with mace (Folger Shakespeare Library, Fanshawe recipe book, search summary). Both imply roughly 12 per cent opium and so roughly 1 per cent morphine (my inference [VERIFY]). "Laudanum" never named one strength: the British tincture of 1914 was about a third stronger than that of 1898 (Davis 1914, search summary).

Restricted knowledge. I found no opium practice held under an obligation of secrecy in the sense of SY-04 (THRIVING library, SY-04). The uses above are public practices documented by named ethnographers and archives.

Any further use of a living community's practice falls under the SY-04 rule.

4. Laudanum, paregoric and the drop

US opium tincture contains 0.90 to 1.10 g of anhydrous morphine per 100 ml, nominally 10 mg per ml, in 17 to 21 per cent alcohol, made from 10 g of powdered opium per 100 ml (USP 35). King's Dispensatory of 1898 gives the same ratio, 100 g to 1,000 ml (King's 1898). US paregoric is 2 mg per 5 ml, or 0.4 mg per ml, 25 times weaker (Kelly and Vaida 2003). The British camphorated tincture contains 50 ml of opium tincture per litre (NHS dm+d), about 0.5 mg per ml by my arithmetic [VERIFY]. The brief's "20 times weaker" is wrong in both countries. WO-11 has the confusion deaths. Kelly and Vaida add a 13-day-old prescribed "DTO 0.7 ml every 4 hours", nearly filled with undiluted tincture, which would have given 42 mg a day instead of 1.68 mg. Their safeguards are the book's: no abbreviations, strength in mg per ml on the label, and dispensing only in small dropper bottles or oral syringes (Kelly and Vaida 2003).

Old doses. Felter gives powdered opium a quarter grain to two grains, about 16 to 130 mg, average 1 grain or 65 mg (Felter 1922), and Ellingwood half a grain to two grains (Ellingwood 1919, search summary). At 10 per cent, 1 grain carries about 6.5 mg morphine, matching the modern oral starting dose (my inference [VERIFY]). The brief's 30 to 60 mg is a sound adult start if the opium is about 10 per cent. For laudanum Felter gives 1 to 30 minims (0.06 to 1.8 ml), warning that large amounts should never be initial doses. King's gives 5 to 30 drops and warns that an unstoppered bottle strengthens by evaporation (King's 1898). The modern label for diarrhoea gives 0.6 ml (range 0.3 to 1 ml) four times a day, maximum 6 ml (glowm, search summary), and RxList 0.6 ml every 6 hours (RxList, search summary). They agree.

The drop is not a measure. The London Pharmacopoeia introduced the minim (about 0.06 ml) in 1809 because drops vary, and a correspondent in 1817 found a drop ranging from one seventy-second to one hundred-and-twentieth of a fluid drachm (On the Necessity of the Minim Measure, 1817), a 1.7-fold spread. Twenty drops to the ml holds for water from a standard dropper. Alcoholic tinctures form smaller drops, and older tables gave about 120 tincture drops per fluid drachm, about 32 per ml (my arithmetic [VERIFY]). One drop of a 10 mg per ml tincture therefore carries about 0.3 to 0.5 mg morphine. ME-02 says dose opium in drops, never spoons (THRIVING library, ME-02). I go further: dose by oral syringe, or by drops only from a dropper whose count per ml is written on the label.

5. Morphine itself: who isolated it, under what conditions, and why a village cannot

This section gives no process. Friedrich Wilhelm Sertürner, born 19 June 1783 and apprenticed at 16 to the court apothecary Cramer in Paderborn, worked on opium from 1803 to 1817 in an apothecary's laboratory, reported in Trommsdorff's journal in 1805 and 1806, moved to Einbeck, and published his full paper in 1817. He tested the substance on himself and three young volunteers at about 30 mg repeated at intervals. The first dose brought flushing and light-headedness, the second drowsiness, the third confusion and near-collapse, and he gave vinegar to make them vomit. He then proposed 15 mg as the dose. Recognition came with an honorary doctorate in 1817 and the Montyon prize in 1831 (Krishnamurti and Rao 2016). I did not read the 1817 paper.

The brief's lead on Gregory is confirmed in its existence. William Gregory, an extra-academical lecturer in chemistry in Edinburgh, published "On a process for preparing economically the muriate of morphia" in 1831 with a letter from Robert Christison, and Edinburgh firms including John Macfarlan's sold morphine hydrochloride by his method from 1833 (Curious Edinburgh 2017). Grace's Guide dates Macfarlan's manufacture to 1832 (Grace's Guide, search summary). "Gregory's salt" was a mixture of morphine and codeine hydrochlorides (Wikipedia, William Gregory, search summary). I did not read the 1831 paper.

Why a village cannot. In every case the work was done by a trained apothecary or chemist, in a stocked laboratory, over years. The first human trial nearly poisoned four people at 90 mg in under an hour. The product is a white

powder about ten times opium's strength by weight, and without an assay no one can tell a 20 per cent powder from a 90 per cent one. Concentrating the drug multiplies its theft value and its tenfold-error risk and adds nothing that a standardised tincture does not already give. The legitimate routes to pure morphine after the Fall are salvage and, as in Uganda, dissolving pharmaceutical powder into an oral solution (section 10).

6. The dose: adult, old, child, by weight

The WHO position. The 2018 WHO cancer-pain guideline recommends starting with an NSAID, paracetamol or an opioid as the pain demands (strong, low-quality evidence), any opioid for maintenance (strong, low), and regular oral morphine with immediate-release morphine for breakthrough pain (strong, moderate), and says immediate-release oral morphine must be available. It demoted the three-step ladder to "a useful educational tool". It starts at 5 mg oral morphine every 4 hours or 2 mg injected, with no ceiling, and treats the oral dose as about twice the injected. Its contraindications are acute respiratory depression, acute alcoholism, paralytic ileus and raised intracranial pressure or head injury. Its precautions are age, acute asthma, kidney and liver impairment, pregnancy and breastfeeding. For stopping it found no trials and advised a gradual taper (WHO 2018).

Two sources for each adult dose.

Patient	First source	Second source	Difference
Naive adult, oral morphine	5 mg every 4 h (WHO 2018)	10 mg every 4 h (MSF Essential Drugs)	twofold. Start at 5 mg after the Fall
Old or frail	2 to 5 mg, smaller and less frequent (Scottish Palliative Care Guidelines)	halve the adult dose (MSF)	agree at about 2.5 mg
Kidney failure	avoid if eGFR under 30 (Scottish guidelines)	halve (MSF), "opium will probably kill" (Felter 1922)	give a quarter, spaced out
Crude opium	1 grain, about 65 mg (Felter 1922)	half to 2 grains (Ellingwood 1919)	agree. Start at 30 to 60 mg
Tincture 10 mg per ml	0.6 ml, range 0.3 to 1 (glowm)	0.6 ml every 6 h (RxList)	agree. Start at 0.5 ml

ICRC's 10 to 20 mg every 2 to 4 hours for trauma is for young injured adults under observation, not a village starting dose (THRIVING library, WO-11). MSF sets a rescue dose equal to the scheduled dose and recomputes the schedule from the last 24 hours: 60 mg regular plus 30 mg rescue makes 90 mg, so 15 mg every 4 hours. It delays a dose if the patient is abnormally drowsy, starts a laxative after 48 hours and uses solution, not tablets, for young children (MSF Essential Drugs). The Scottish guidelines name vivid dreams, hallucinations and myoclonic jerks as toxicity before breathing slows. ME-02's quarter-dose start for an unknown batch stands.

Children. WHO 2012 gives oral immediate-release starting doses every 4 hours of 80 to 200 micrograms per kg from 1 to 12 months, 200 to 400 from 1 to 2 years, and 200 to 500 from 2 to 12 years, maximum 5 mg. Neonates get injected morphine only, 25 to 50 micrograms per kg every 6 hours. Outpatient increases are capped at 50 per cent a day, doses are cut by a quarter in mild to moderate kidney impairment and by half in severe, and codeine is not recommended (WHO 2012). MSF gives 0.15 mg per kg every 4 hours over 6 months, below the WHO lower bound over 1 year (MSF Essential Drugs). WO-11's 0.2 to 0.5 mg per kg is an injection before a dressing. ME-02 bans opium under 12. I agree for crude opium, poppy tea and any batch of unknown strength, and disagree for a standardised solution measured by syringe at the district, where the WHO doses apply and untreated pain is its own harm.

Dosing card by weight. This is for a 1 mg per ml oral solution measured by syringe, in a child over 1 year, taking the lower of WHO 2012 and MSF, rounded down.

Weight	Rough age [VERIFY]	WHO 2012	MSF 0.15 mg/kg	Start	Volume
10 kg	1 year	2 to 4 mg	1.5 mg	1.5 mg	1.5 ml
15 kg	3 years	3 to 5 mg	2.25 mg	2 mg	2 ml
20 kg	6 years	4 to 5 mg	3 mg	3 mg	3 ml
30 kg	9 years	5 mg (cap)	4.5 mg	4 mg	4 ml
40 kg and over	12 and over	adult	adult	5 mg	5 ml

Weigh the child. Under 1 year, under 10 kg, or with diarrhoea, dehydration or malnutrition, there is no opium at the village rung. That is the conservative position of section 8, not a WHO rule.

The dose that kills. No source I could read gives a reliable lethal oral morphine dose for a naive adult, and the 120 to 200 mg circulating online comes from non-authoritative pages. The case record gives floors. One teaspoon of tincture, about 50 mg, killed a 51-year-old woman, and 5 ml given in place of paregoric killed an elderly man three days later (Kelly and Vaida 2003). The nineteenth-century record compiled by Pollard and others gives infant deaths from a single minim of laudanum in a day-old child and from four drops in infants of some months (Pollard 1858 and the authors he cites [VERIFY which author]). A review of 27 paediatric cases of opioid-induced respiratory depression found 7 deaths and 8 iatrogenic overdoses, with kidney failure, codeine in ultra-rapid metabolisers and tonsillectomy as risks (Niesters and others 2013, abstract). Tolerance changes everything. A palliative patient may safely take hundreds of milligrams a day, the same dose kills a naive adult, and that is why lost tolerance kills the formerly dependent (section 9).

7. Overdose: signs, breathing, naloxone

Felter's opium poisoning runs from overpowering drowsiness to stupor, snoring breathing, pinpoint pupils, slowing breaths and blue lips. His treatment was to keep the patient awake, walk him between two attendants and give artificial respiration (Felter 1922). WHO 2012 gives the same triad of pinpoint pupils, respiratory depression and coma, and manages moderate overdose by assisted breathing. The brief's line of 10 breaths a minute is the stop line for the next dose, and ME-14 uses 12 as the line to breathe for the patient (THRIVING library, ME-14). I did not confirm either against a primary source [VERIFY].

Rescue breathing is the village's real antidote, and ME-14 gives the technique, rates and relays. WHO's 2014 community guideline recommends naloxone and training for likely witnesses, airway management and ventilation, and the recovery position if the patient vomits (WHO 2014, via ACEP Now summary). Naloxone after the Fall is salvage only, with adult doses in WO-11. WHO 2012 adds that a child on regular opioids for pain gets 1 microgram per kg repeated every 3 minutes, since a big dose reverses the pain relief and causes acute withdrawal, while a naive child gets 10 then 100 micrograms per kg. Naloxone wears off in 20 to 60 minutes, sooner than morphine, so watch and repeat (WHO 2012).

8. Who must never receive it

- **Infants.** Thomas Bull found in 1854 that three-quarters of opium deaths were under five (THRIVING library, FO-05). Quieting cordials also suppressed appetite, and some infants starved while drugged (Myers 2020). WHO allows no oral morphine to neonates (WHO 2012). Felter wrote that paregoric "should under no circumstance or in any dose be administered to infants", in the same book that gives an infant dose (Felter 1922).
- **The breastfed infant of a mother on opioids.** A breastfed 13-day-old died whose mother, a CYP2D6 ultra-rapid metaboliser, took codeine. His serum morphine was 70 ng per ml and the frozen milk held 87 (Koren

and others 2006, via Sajantila 2012). A mother who needs opium breastfeeds only with the infant watched for drowsiness and poor feeding (my inference from the case [VERIFY]).

- **The drowsy and the drunk.** Acute alcoholism and respiratory depression are WHO contraindications (WHO 2018), and MSF delays a dose in the abnormally drowsy.
- **The head-injured.** A WHO contraindication in adults, and excluded in children unless breathing is controlled (WHO 2018, WHO 2012).
- **Asthma in attack.** A precaution in adults and a contraindication in children (WHO 2018, WHO 2012).
- **The dysenteric or dehydrated child.** No trial of opium in children's diarrhoea was found. A systematic review of loperamide, an opioid antidiarrhoeal, found ileus, lethargy or death in 8 of 927 children, all under 3, and judged harms to outweigh benefits under 3 and in the malnourished, dehydrated and those with bloody diarrhoea (Li and others 2007). By analogy opium is X here [VERIFY, analogy]. The child needs oral rehydration. I did not find the WHO diarrhoea manual's wording.
- **Kidney failure, the old and the frail.** "Children and old persons are profoundly affected" (Felter 1922). Halve in renal impairment (MSF) and avoid below eGFR 30 (Scottish guidelines).
- **The undiagnosed surgical abdomen and pregnancy near term.** Opium hides the signs of the first and produces a dependent newborn in the second. Give it to the first only once the decision on surgery or transport is made [VERIFY, standard teaching not sourced here]. Pregnancy is a WHO precaution (WHO 2018).

9. Dependence, withdrawal and the words for them

How fast. A CDC study of 1,294,247 opioid-naive patients found 6.0 per cent still taking opioids a year after a first prescription of at least 1 day's supply, 13.5 per cent after 8 or more days and 29.9 per cent after 31 or more, with the steepest rises after the fifth and the thirty-first day (Shah, Hayes and Martin 2017). I found no source for the brief's "tolerance in about 2 weeks" [VERIFY]. The nearest is the WHO rule that a child on opioids for 7 to 14 days is tapered, not stopped, which implies physical dependence within that window (WHO 2012). The village rule follows: plan acute opium for 3 days and review on day 5.

How common. A systematic review of 38 studies of chronic pain patients on opioids found misuse in 21 to 29 per cent and addiction in 8 to 12 per cent (Vowles and others 2015). Critics, Scholten and Henningfield among them, disputed how misuse was defined, and I read only summaries [VERIFY]. The opposite claim rests on a five-sentence letter by Porter and Jick in 1980, which reported 4 addictions among 11,882 inpatients and was later cited by Purdue as showing that under 1 per cent of patients become addicted, which it never showed (Wikipedia, Porter and Jick, search summary).

Withdrawal. After a short-acting opioid, onset is at 6 to 12 hours, peak at 24 to 72 hours and the end at 7 to 10 days. After methadone, onset is 24 to 72 hours, peak 4 to 6 days, and the course 14 days or more. The signs are yawning, tears, running nose, sweating, wide pupils, gooseflesh, aching, vomiting and diarrhoea, and withdrawal is usually not dangerous except in the newborn (WikEM). Darke, Larney and Farrell corrected this: people do die of withdrawal, through vomiting and diarrhoea that dehydrate them, usually in custody, and every such death is preventable with fluids (Darke, Larney and Farrell 2016). The deadliest moment comes after withdrawal: in the first two weeks after release from prison the risk of drug death is three to eight times that of the next ten weeks, because tolerance has gone (Merrall and others 2010, via secondary review). The library's MI-06 on withdrawal does not exist yet.

The taper. After 7 to 14 days of opioids, cut by 10 to 20 per cent every 8 hours. After longer use, cut by no more than 10 to 20 per cent a week (WHO 2012). The Rolleston Committee of 1926 reached the same view for adults by consensus (Wikipedia, Rolleston Committee, search summary).

The words. These definitions are proposals, drawn from the sources above, for use at the bedside without contempt. - **Tolerance.** The same dose does less. It comes to anyone on regular opium, and it is why the palliative dose climbs. - **Dependence.** The body has adjusted and is ill if the drug stops suddenly. It comes to anyone on regular doses beyond a week or two. It is a property of the drug, not a fault in the person, and the answer is a taper. - **Withdrawal.**

The illness of stopping. Miserable, rarely dangerous, dangerous through dehydration. - **Addiction, or the habit.** Taking it for its own sake, against one's interest, with craving and loss of control. In 1926 the Rolleston Committee endorsed the view that it "must be regarded as a manifestation of disease" (Rolleston Committee 1926, as quoted in secondary summary). - **Lost tolerance.** The state of the formerly dependent, in whom the old dose kills. - **The opium eater.** The nineteenth-century English term for a regular user, often a labourer or a Fenland mother self-medicating (Berridge, via secondary summary). Use it historically, never for a patient.

10. The policy record and the locked chest

Britain, 1851 to 1926. The Arsenic Act of 1851 required sellers to record the buyer's name, address and purpose, and to sell only to people known to them or brought by a witness who also signed (Wikipedia, Arsenic Act 1851, search summary). A poisons bill failed in 1857 (THRIVING library, ME-02). The Pharmacy Act of 1868 placed opium and all preparations of opium or of poppies in its schedule of poisons, to be labelled "poison" and sold only by registered chemists, but exempted patent medicines (Wikipedia, Pharmacy Act 1868, search summary, and THRIVING library, FO-05). Opiates caused 126 of 403 poisoning deaths in 1863, and the opiate death rate was about 6.4 per million in 1869 and 4.2 in 1912, by Berridge's figures (Wikipedia, Pharmacy Act 1868, search summary [VERIFY]). The Hague Convention of 1912 bound its parties to control opium, morphine and cocaine, and Britain gave it effect in the Dangerous Drugs Act 1920, with regulations from 1 September 1921 (Wikipedia, Dangerous Drugs Act 1920, search summary). The Rolleston Committee of 1926, under Sir Humphry Rolleston, accepted gradual reduction as treatment and small maintenance doses for those who could not be weaned. The resulting "British system" coexisted with an addict population seldom above about 600 until the early 1960s, and whether it caused the small number is disputed (Wikipedia, Rolleston Committee, search summary).

The international balance. The 1961 Single Convention opens by declaring that the medical use of narcotic drugs "continues to be indispensable for the relief of pain and suffering", then calls addiction a serious evil (Single Convention 1961). The Lancet Commission of 2017, chaired by Felicia Knaul, measured the failure of the first half. Of 298.5 tonnes of morphine-equivalent opioids, 10.8 tonnes (3.6 per cent) went to low- and middle-income countries and 0.1 tonne (0.03 per cent) to low-income countries, where under 2 per cent of need is met. A 10 mg dose cost 3 US cents in rich countries and 16 in poor ones (Knaul and others 2017, via secondary summaries).

India: the licensed village. About 121,000 farmers are licensed for 2025-26 (Tribune India 2025). Each day's harvest is weighed into a Preliminary Weighment Register kept by the village headman (*lambardar*) and inspected by Central Bureau of Narcotics staff, and the crop is weighed and tested at the collection centre (Global Agriculture, India calendar). The minimum-yield rule stops a farmer under-declaring and selling the difference. It leaks all the same: an estimated 300 tonnes of licit opium were diverted in 1999 (ICMR 2008). A register keeps honest only those it counts.

The dispensary record. Anne Merriman founded Hospice Africa Uganda in 1993. Its oral morphine was made by weighing imported morphine powder and dissolving it with a preservative and a dye that shows the strength, the "kitchen sink method", with about a year's shelf life. It was free from the state, and trained nurses and clinical officers could prescribe (Cancerworld 2023, search summary). I found no diversion figures for Uganda. In Kerala, community palliative networks raised morphine access to at least four times the Indian average, and a population study reported no evidence of misuse or diversion (Rajagopal, Karim and Booth 2017, via Pallium India summary). British Schedule 2 drugs are kept in a locked receptacle that only the person in lawful possession, or someone they authorise, can open, with every receipt, administration and disposal registered (SPS 2024, search summary). I did not confirm the wording of the running balance or witnessed destruction [VERIFY].

The locked-chest rule, assembled from that record: 1. One chest, one lock, one keyholder and one named deputy (UK Schedule 2 practice). 2. A bound book with numbered pages and a running balance (Indian weighment and UK register practice). 3. Every dose written: date, hour, patient, dose, giver, new balance. A witness signs anything destroyed or missing. 4. A monthly count by someone other than the keyholder. 5. One strength only leaves the

chest, labelled in mg per ml, coloured and dated (Kelly and Vaida 2003 safeguards, the Ugandan dye). 6. A few days' supply at most goes home, and unused doses come back to the book. Items 4 and 6 are my inference, not a documented historical rule [VERIFY].

The owner's decision [OWNER]. The record allows three choices, each with a death toll. - **Do not grow.** Rely on salvage and trade, and accept untreated pain when they run out. This avoids Westermeyer's three- to four-fold rise in addiction but leaves the dying with nothing stronger than willow and alcohol. - **Grow at the district only,** on one plot under the Indian pattern, weighed daily, blended into one standard tincture, locked, and issued to village dispensaries by register. It will leak, as India's 300 tonnes show. - **Grow in households,** as ornamental gardens already do. The widest access and the least control. This is Westermeyer's growing village. The research cannot choose between the death of pain untreated and the death of dependence. It can only state both.

Evidence grades

Practice	Tradition says	Record shows	Grade
Opium or oral morphine for severe acute and terminal pain	the universal remedy (Sydenham, Unani)	WHO strong recommendation, moderate evidence	A
WHO paediatric doses by weight	none	WHO 2012, low-quality evidence	B
Tincture at 10 g opium per 100 ml as a 1 per cent standard	pharmacopoeial	USP and King's agree, true strength follows the opium	B ratio, C strength
Blending a harvest into one batch	the Indian collection centre	narrows variation, unmeasured	C
Counted drops	old pharmacy	1.7-fold spread, the minim invented to fix it	D, A for the oral syringe
Poppy-head tea or *doda* as "mild"	household and Rajasthani use	straw 0.15 to 1.85 per cent, seed-tea deaths	X for dosing
Amal for endurance and long life	Rajasthan	integrated use beside common dependence	D
Opium for adult diarrhoea	Ayurveda, Unani, Felter	still on the US label	B
Opium for children's diarrhoea	Godfrey's, the household	infant deaths, loperamide harm under 3	X
Rescue breathing in overdose	Felter's artificial respiration	ventilation treats the cause of death	B
Naloxone	none	WHO 2014	A where salvaged
Gradual taper	Rolleston 1926	WHO best practice, no trials	C
Locked chest and register	poisons books since 1851	reduces but does not stop diversion	B

Means ledger

Rung	What it can do	What it changes
Hands and knowledge	Know the ornamental is the drug plant, the overdose signs, who must never have it, and how to breathe for a patient.	Prevents the poppy-tea and infant deaths and saves the overdosed found in time.
Hearth	Grow a plot, lance and dry. Keep it for the household's adult dying. Rehydrate the child with diarrhoea instead.	A crude, unmeasured analgesic with every risk of section 2. Most household harm happens here.
Garden and still	A balance, spirit for tincture at 10 g per 100 ml, a counted dropper, a labelled bottle, a reference sample.	A dose of known nominal strength, and the 25-fold concentrate risk with it.
Village dispensary of 300	One named preparer, one chest, one register, one dilute strength, oral syringes, a child scale, the card, breath counts, rescue-breathing relays.	Makes the WHO doses usable. Expect theft and the second strength.
District infirmary of 3,000	The licensed plot, blending, stock tincture, 1 mg per ml solution, a balance to 10 mg, salvaged morphine and naloxone, monthly audit of village chests.	Standardises across villages, adds the antidote, makes the [OWNER] policy enforceable or not.
Hospital before the Fall	Assayed morphine, pumps, naloxone, oximetry, ventilators, addiction services, opioid substitution.	Reduces dose error to prescribing error, and did not prevent the modern epidemic.

Harm test

How it kills. By stopping breathing, slowly in sleep or fast after a big dose. By vomit inhaled in stupor. By hiding a surgical abdomen or a rising head injury. By ileus. By dehydration in withdrawal. By the overdose of lost tolerance.

The errors that harm. Tincture for paregoric (25-fold). The decimal, 0.5 ml given as 5 ml. The unlabelled bottle. The evaporated tincture (King's 1898). This year's batch twice last year's. Tea from a different cultivar. The child's dose to an infant, the adult's to the old or the uraemic.

Who must never, and misidentification. Section 8. The ornamental taken as harmless, unwashed seed, opium cut once it has a price, a white powder sold as morphine.

Signs, and what to do. Unusual drowsiness, pinpoint pupils, slow then shallow breathing, snoring, unrousable, blue lips. Stop the next dose, wake and keep awake, count breaths, breathe for them below the line, give salvaged naloxone, and watch for as long as the opium lasts.

Historical harm. Godfrey's Cordial (THRIVING library, FO-05). Infants killed by drops. The paregoric deaths (Kelly and Vaida 2003). Stephen Hacala's death from poppy-seed tea in 2016 (THRIVING library, WO-11). Female infanticide by opium (ICMR 2008). And 105,007 US overdose deaths in 2023, about 69 per cent from synthetic opioids, with 11,871 involving natural and semi-synthetic opioids (CDC NCHS 2024, KFF, both search summary).

Red flags

- **Breathing under about 10 a minute in an adult, or pauses in a child, and unrousable.** Death within the hour without breathing support. Breathe for them, give naloxone if held.
- **Pain rising whatever is given, with a rigid belly, fever or vomiting.** A surgical abdomen. Decide on transport or surgery, and if neither is possible, give opium as comfort care and say so.
- **Head injury with deepening drowsiness.** Withhold opium. The decline may be the brain.
- **Little or no urine on regular opium.** Accumulation. Cut by half to three-quarters and lengthen the interval.
- **Jerks, hallucinations or vivid dreams.** Toxicity before breathing slows (Scottish guidelines). Cut the dose.
- **Withdrawal with profuse diarrhoea and vomiting.** Rehydrate and taper.
- **A former regular user taking the old dose.** Lost tolerance.

Honest comfort. WHO sets no ceiling for cancer pain and the MSF rule raises the dose day by day. A dying patient kept comfortable, with the dose rising to match the pain, has been treated, not killed, and the book should say so plainly. The death of someone left in pain because the healer feared the drug is also a death the record counts.

The case against

Against growing opium at all. Joseph Westermeyer's Laotian data show addiction three to four times higher where the poppy grows (Westermeyer 1979). Virginia Berridge's history of nineteenth-century England shows a free market medicating a population, infants first (Berridge and Edwards, via secondary summary). India's licensed system, with every register a state can build, leaked an estimated 300 tonnes in one year (ICMR 2008). The American crisis shows that an opioid prescribed in good faith can seed an epidemic (Shah, Hayes and Martin 2017, CDC NCHS 2024).

Against fearing it. Felicia Knaul's Commission found that the world's poorest receive 0.03 per cent of its morphine (Knaul and others 2017). Anne Merriman in Uganda and M. R. Rajagopal in Kerala built nurse- and volunteer-run programmes without a documented diversion epidemic (Cancerworld 2023, Rajagopal, Karim and Booth 2017). Oliver Wendell Holmes, who would have sunk most of the materia medica, kept opium (THRIVING library, FO-05).

Against both romances. Opium is not gentle because it grows in a garden: poppy-head tea is the least dosable form, the ornamental is the drug plant, and Godfrey's Cordial was a household remedy. Modern does not mean honest either: Purdue built on a five-sentence letter, the WHO guidelines rest mostly on low-quality evidence, and the WHO ladder the brief names has been demoted (WHO 2018).

Where I disagree with the library. With ME-02's absolute ban under 12, for standardised solution at the district. With ME-14's threshold of 12, which I treat as the line to breathe for the patient while the brief's 10 governs withholding the dose [VERIFY both].

10-line summary

1. Every *Papaver somniferum*, ornamentals included, is the drug plant. Ornamental capsules averaged 0.36 per cent morphine.
2. Afghan yields ran 18 to 56 kg of opium per hectare in 2009 to 2022 and Indian licence minima 47 to 56. A 100 square-metre plot gives about 0.2 to 0.5 kg.
3. Opium is 8 to 19 per cent morphine. Capsule and seed vary far more, so poppy tea cannot be dosed.
4. Tincture at 10 g opium per 100 ml is nominally 10 mg morphine per ml. Paregoric is 25 times weaker, and confusing them has killed.
5. Drops vary 1.7-fold. Dose by oral syringe.
6. Start adults at 5 mg (WHO) to 10 mg (MSF) oral morphine every 4 hours, the old at about 2.5 mg, children over 1 year at 0.15 to 0.2 mg per kg, maximum 5 mg.
7. Never to infants, the drowsy, the drunk, the head-injured, the asthmatic in attack or the dysenteric child.

8. Overdose is stupor, pinpoint pupils and slow breathing. Rescue breathing saves life, and naloxone is salvage only.
9. Use at one year rose from 6 per cent after 1 day's supply to 30 per cent after 31 days. Withdrawal kills only by dehydration, lost tolerance kills most.
10. Availability raised addiction three- to four-fold in Laos, scarcity leaves the poor world's dying in pain, and the policy is the owner's.

Open questions

- The labour of lancing and collecting per hectare. No source found.
- A field key separating *P. bracteatum* and subsp. *setigerum* from the cultivated plant.
- A lethal oral morphine dose in the naive adult, which may not exist as one figure.
- When physical dependence begins. The brief's 2 weeks is unsupported but plausible.
- Whether blending a harvest narrows its strength enough to make a nominal 1 per cent tincture safe without assay.
- Diversion from nurse-led programmes such as Uganda's.
- The Ayurvedic and Unani doses of *ahiphena* and the traditions' rules on who may prepare it.
- Whether the "British system" kept addiction low or coincided with a society where it was low.

Sources to read in full

1. WHO 2018, Guidelines for the pharmacological and radiotherapeutic management of cancer pain in adults and adolescents.
2. WHO 2012, Guidelines on the pharmacological treatment of persisting pain in children with medical illnesses.
3. MSF, Essential Drugs morphine monograph, and the clinical guidelines pain chapter (not read).
4. Westermeyer 1983, Poppies, Pipes and People.
5. Berridge and Edwards 1981, revised 1999, Opium and the People.
6. Krishnamurti and Rao 2016 on Sertürner, and Sertürner's 1817 paper.
7. Shah, Hayes and Martin 2017, MMWR.
8. Knaul and others 2017, the Lancet Commission on palliative care and pain relief.
9. ICMR Bulletin 2008 on opium in India.
10. Booth 1996, Opium: A History (not read).

At the bedside after the Fall

Household. Minimum viable: know that every garden poppy is an opium poppy, never give poppy tea or opium to a child, count breaths in anyone who has taken it, breathe for them if they slow and cannot be roused, and rehydrate the child with diarrhoea. It needs this knowledge and a clock. First failure to expect: a well-meant poppy-head tea for a teething or crying child.

Village of 300. Minimum viable: one named, trained healer with one chest, one register, one dilute strength (1 mg per ml), oral syringes and the dosing card, for adults in severe pain, the injured once the surgery decision is made, and the dying, with breaths watched and relays of rescue breathers trained. It needs the chest, the book, a child scale, syringes, coloured labelled bottles and a supply from the district or salvage. First failure: theft from the chest, and a second, stronger bottle kept "for emergencies".

District of 3,000. Minimum viable, if the owner so decides: one licensed plot of a known cultivar, weighed daily, blended into one batch, made into one stock tincture at 10 g per 100 ml in the infirmary chest, villages supplied with 1 mg per ml solution by register, salvaged morphine and naloxone held centrally, and every village chest audited monthly. It needs the plot and its guard, a balance to 10 mg, spirit, glass, a healer, a deputy and an honest auditor. First failure: under-declared harvest sold out of the district, the Indian leak.

Protocols

Protocol 1. Cultivation sheet (100 square metres) 1. Choose a sunny, sheltered, well-drained plot without poppy for 3 years (FAO). 2. Sow in autumn where winters stay above about minus 5°C, otherwise in late March. Use 5 to 15 g of seed mixed with sand. 3. Sow in rows about 30 cm apart and thin to about 10 to 15 cm once the rosette forms [VERIFY, inferred from 300,000 per hectare]. 4. Weed through the rosette, 50 to 60 days. Expect flowers about 90 to 120 days from a spring sowing. 5. Mark the date each plant's petals fall. 6. About 7 days after petal fall, test-cut one capsule late in the afternoon. Thick white latex means ready. Watery latex means wait 2 days and test again. 7. Lance late in the afternoon with shallow cuts, 3 to 5 per capsule. Scrape the dried latex next morning. Repeat every second day, 3 to 4 times, until the latex stops. 8. Do not harvest in rain. 9. Weigh each day's collection into the register with date, collector and weight. 10. Dry in shade to constant weight, the same on two weighings a week apart, and record it. 11. Save seed from the best plants, labelled.

Protocol 2. Standardising a batch without a laboratory 1. Blend the whole season's dried opium into one batch. 2. Seal and label a 5 g reference sample of each year's batch. 3. Weigh 10 g of blended dried opium for every 100 ml of finished tincture (USP 35, King's 1898). 4. Make it in diluted spirit as the old pharmacopoeias did, shake daily for about a week, strain and make up to the mark [VERIFY maceration time and spirit strength, no primary source read]. 5. Label "OPIUM TINCTURE, 10 mg morphine per ml if the opium is 10 per cent, batch, year, date, POISON". No abbreviations. 6. Store in the chest, stoppered and filled to the neck (King's 1898). 7. To dispense, dilute 1 volume of tincture with 9 of clean water in a coloured, differently shaped bottle labelled "OPIUM SOLUTION, 1 mg per ml". Only this leaves the chest. 8. Start the first three adults on a new batch at a quarter of the card dose and record the dose at which each reaches relief and at which each is drowsy (THRIVING library, ME-02). 9. If the new batch relieves at clearly less than last year's, mark it "stronger, half dose" until the next batch. 10. Count how many drops of each dropper make 1 ml in a marked syringe and write it on the label.

Protocol 3. Dosing card 1. Weigh the child. Never guess. 2. Over 12 years and 40 kg, healthy: 5 mg (5 ml of 1 mg per ml) every 4 hours. 3. Old, frail or very thin: 2.5 mg every 4 hours. 4. Little urine, swelling or uraemic breath: 1 to 2 mg every 6 to 8 hours. 5. Child 1 to 12 years and 10 to 40 kg: the weight table in section 6, never above 5 mg a dose. 6. Under 1 year, under 10 kg, or a child with diarrhoea or dehydration: no opium at the village. Refer to the district. 7. Pain unrelieved after 1 hour: one rescue dose equal to the regular dose. 8. Each morning, add the last 24 hours' doses, divide by 6, and use that as the new 4-hourly dose (MSF). In a child, raise by no more than half in a day (WHO 2012). 9. Laxative from day 2. 10. Before each dose, check the patient rouses easily and an adult breathes at least 10 a minute. If not, skip the dose and watch.

Protocol 4. Overdose 1. Shout the name, shake the shoulder, rub the breastbone. 2. Count breaths for a full minute. 3. Adult under 10, or unrousable: tilt the head, lift the chin, breathe for them at 10 a minute, a child at 20 to 30 (THRIVING library, ME-14). 4. Give salvaged naloxone as in WO-11. A child on regular opium gets 1 microgram per kg every 3 minutes (WHO 2012). 5. If they vomit, turn them on their side. 6. Watch at least 4 hours after the last naloxone [VERIFY interval], since it wears off in 20 to 60 minutes. 7. Record it in the register.

Protocol 5. The locked chest 1. One chest, one lock, two keys: the healer's and the named deputy's. 2. One bound book with numbered pages. Never tear out a page. 3. Every entry: date, hour, patient, dose, volume, giver, new balance. 4. On the first of each month an auditor who is not the keyholder measures the stock, and both sign any difference. 5. Destroy spoiled stock before a witness, and both sign. 6. One strength only leaves the chest. 7. At most 3 days' supply goes home, and returns are recorded [OWNER on the number of days].

Protocol 6. Taper and withdrawal care 1. Anyone on regular opium for 7 days or more is tapered, not stopped. 2. After 1 to 2 weeks, cut by 10 to 20 per cent a day [VERIFY, adapted from the WHO 8-hourly rule]. After longer, cut 10 to 20 per cent a week (WHO 2012). 3. Withdrawal signs (running nose, yawning, gooseflesh, diarrhoea, vomiting) mean slow the taper. 4. Give oral rehydration solution freely with diarrhoea or vomiting. 5. Warn the patient and family that the old dose may now kill.

Numbers to carry

1. Tincture of opium is 10 mg morphine per ml. Paregoric is 0.4 mg per ml, 25 times weaker.
2. Adults start at 5 mg oral morphine every 4 hours, the old at 2.5 mg.
3. Children over 1 year start at 0.15 to 0.2 mg per kg every 4 hours, maximum 5 mg.
4. One grain of opium, about 65 mg, carries about 6.5 mg morphine.
5. Under 10 breaths a minute in an adult, stop the next dose. Unrousable, breathe for them at 10 a minute.
6. Naloxone wears off in 20 to 60 minutes.
7. Opium is 8 to 19 per cent morphine, poppy straw 0.15 to 1.85 per cent.
8. A 100 square-metre plot gives 0.2 to 0.5 kg of opium.
9. Use at one year: 6 per cent after 1 day's supply, 30 per cent after 31 days.
10. Addiction was 3 to 4 times higher where the poppy grows.

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