IN-03 Pneumonia and the chest: diagnosis by hand and the pre-antibiotic regimen

HEALING after the FALL, research library, IN-03

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

Scope. Acute pneumonia in children and adults: what it did before antibiotics, how to recognise it by eye, hand and ear, which antibiotic the village keeps and at what dose, what nursing helps without a drug, and what the traditional chest remedies are worth. It builds on the child-survival material in the library's first infection report (THRIVING library, IN-01) without repeating it. Fever, sepsis, the salvage antibiotic list and tuberculosis belong to other reports. The References say where only an abstract or secondary summary was read. [VERIFY] marks a claim I could not confirm or my own inference.

1. Findings by section

1.1 What pneumonia did before antibiotics

The clinical picture. Osler's first edition of The Principles and Practice of Medicine (Osler 1892) is the best description of lobar pneumonia untreated by any drug that worked. It began with a rigor, a stabbing pain in the side and high fever. Respirations rose to 40 to 60 a minute in adults and up to 80 in children. In those who lived the fever fell "by crisis", a drop of up to 8°F within 5 to 12 hours with drenching sweat: "after persisting for from seven to ten days the crisis occurs". It could come as early as day three or as late as day 12 to 14, and a false crisis around day five could deceive the nurse. A delirious man admitted to the Philadelphia Hospital on day seven with a temperature of 105°F reached his crisis on day eight with no medicine. Everything the nurse did was meant to carry the patient alive to that day.

Case fatality in hospital series. Osler (1892) put hospital mortality at 20 to 40 per cent: 20.4 per cent of 1,012 cases at the Montreal General Hospital and 28.01 per cent of 3,969 at the Charity Hospital of New Orleans. A St Thomas's Hospital series of 708 cases showed the climb with age: 3.7 per cent under 20, 22 per cent in the third decade, 30.8 in the fourth, 47 in the fifth, 51 in the sixth and 65 in the seventh. He judged it "the natural end of the old man".

The eighth edition, revised with Thomas McCrae (Osler and McCrae 1916), shows no improvement. Johns Hopkins from 1889 to 1905 lost 200 of 658 patients (30.4 per cent). The London Hospital's 5,097 cases from 1854 to 1903 showed no fall in fatality over half a century. By age, mortality was about 20 per cent at 21 to 30, 30 per cent at 31 to 40 and more than half over 60, and 33 of Osler's own 44 patients over 60 died. Of 50 children under ten, 4 died. Fit young soldiers of the German army died at only 3.6 per cent in over 40,000 cases, and private practice reported 6 to 18 per cent. Pneumonia was, in Bunyan's phrase that Osler borrowed, the "Captain of the Men of Death".

Tilghman and Finland 1937. I could not read this paper (Tilghman and Finland 1937). Its figures survive in the 2008 Infectious Diseases Society of America position paper that reread the pre-antibiotic literature (Spellberg et al

2008). Untreated pneumococcal pneumonia killed 32 of 301 patients under 30 (11 per cent), 154 of 563 aged 30 to 59 (27 per cent) and 96 of 140 aged 60 or over or in poor condition (69 per cent). Bullowa's New York series gave 14, 34 and 59 per cent. The brief places the series at the Massachusetts General Hospital, but Finland worked at the Boston City Hospital [VERIFY]. The library's first report applies the 69 per cent to those over 60 (THRIVING library, IN-01). The source band includes younger patients in poor condition, so it overstates the risk for a fit 65-year-old.

What the whole record says. Spellberg and colleagues (2008) pooled every series they could find. In historical-control studies 38 per cent of untreated patients died against 12 per cent given sulfonamides or penicillin, an absolute reduction of 26 points (95 per cent confidence interval 24 to 28). Finland's own comparison was 41 per cent of 2,832 against 17 per cent of 1,220. In concurrently controlled studies, less open to bias, it was 23 against 7 per cent, a reduction of 16 points (10 to 22). By age, untreated mortality was 12, 32 and 62 per cent under 30, at 30 to 59 and at 60 and over, against 1, 5 and 17 per cent treated. One death was prevented for roughly every nine young adults, four middle-aged and two old people treated [VERIFY: my arithmetic].

Two things matter for the village. Untreated pneumonia rarely turned quickly: only 1.4 per cent of Bullowa's 662 untreated survivors were free of fever by day two and 2.6 per cent by day three, against 83 and 99 per cent of Flippin's 100 sulfonamide-treated patients (Spellberg et al 2008). A fever that has not settled by 72 hours on a drug needs rethinking. And the treated mortality of the 1940s by age (1, 5 and 17 per cent) matches what the modern pneumonia severity index predicts (0.75, 5.3 and 18.1 per cent). In the typical case, modern hospitals have added little to a cheap antibiotic, the most encouraging finding in this report for a community without one.

Survivor bias. Hospital series are not the population. The dying were often not admitted, the poor came late, and mortality fell to about ten per cent once the old and debilitated were excluded (Osler 1892). Fit soldiers and comfortable private patients did much better than charity wards. A village's death rate will depend mostly on who falls ill.

Why people died. Pneumococcal bacteraemia was the strongest predictor of death. Klugman and colleagues (2009) used the pre-antibiotic pneumococcal record to argue that the interval from onset to death in the 1918 pandemic fits secondary pneumococcal pneumonia [VERIFY: exact intervals not rechecked]. Even with penicillin, Austrian and Gold's bacteraemic patients died at 17 per cent (Spellberg et al 2008). Some pneumonia kills before any drug can act.

1.2 Serum, sulfapyridine and penicillin: what each step changed

Serum therapy (1913 to 1940). Rufus Cole's horse antiserum against Type I pneumococcus cut mortality from over 25 to 7.5 per cent at the Rockefeller Institute (Podolsky 2005). Park's alternate-patient study of 223 patients in 1928 found 20 against 34 per cent (Spellberg et al 2008). The Massachusetts Pneumonia Study and Service treated about 1,000 patients by 1935, 22 per cent at home, and Type I mortality fell from nearly 25 to 11.1 per cent with serum within four days (Podolsky 2005). Serum needed typing, a cold chain, intravenous injection and a laboratory, and caused serum sickness. After the Fall it is not feasible below a well-equipped district [VERIFY: inference].

Sulfapyridine, M and B 693 (1938). At Dudley Road Hospital in Birmingham, March to June 1938, Evans and Gaisford gave May and Baker's new compound to adults with lobar pneumonia admitted on alternate days (Evans and Gaisford 1938, read in full). Of 100 treated 8 died, against 27 of 100 controls, and at ages 10 to 40, 3 against 16 per cent. The better regimen was 2 g at once and then 1 g every four hours for 72 hours, about 25 g in all, maximum 9 g in 24 hours. Six of the eight treated deaths had the smaller early doses. A quarter of the intensively treated became cyanosed and six had methaemoglobin. The hospital's own mortality had been 25.6 and 30 per cent in 1937 and 1938. In the United States the drug went into national use in early 1939, and federal pneumonia funding fell from $523,225 in 1941 to $40,802 in 1945 as serum programmes closed (Podolsky 2005).

Penicillin (from the 1940s). Penicillin brought mortality in the concurrent trials to about 7 per cent and in Dowling and Lepper's series to 5 per cent (Spellberg et al 2008). It was safer than sulfonamides and covered more organisms.

Overuse followed: Reimann estimated in 1961 that 90 per cent of antimicrobial use was unnecessary, and penicillin-resistant pneumococci in the United States rose from 3.6 per cent in 1987 to 24 per cent in 1998 (Podolsky 2005).

What each step changed, in round numbers. Nursing alone: 20 to 40 per cent mortality in hospital adults. Serum within four days for Type I: about 8 to 11 per cent. Sulfapyridine: about 8 per cent in the Birmingham trial. Penicillin: about 5 to 7 per cent. Modern hospital care: no further fall in the typical case. The drug, not the hospital, is the step that matters.

1.3 Diagnosis by hand in children

The WHO thresholds. Breathing is fast if the count over a full minute is 60 or more under 2 months, 50 or more at 2 to 12 months and 40 or more at 1 to 5 years (WHO 2014, THRIVING library, IN-01). Hesperian's lay guide gives the same figures and the practical rules: count only when the child is calm, rest a hand on the belly, and let one person watch the clock while another counts (Hesperian n.d.). Shann, Hart and Thomas (1984) in Papua New Guinea, with 350 children, proposed indrawing for referral and a rate above 50 for antibiotics, and found a mother's report of fast breathing nearly as accurate as the count (read through Pio 2003). Cherian and colleagues (1988) in Vellore, with 682 children, found the thresholds sensitive and specific up to 35 months but less sensitive above (abstract). The brief's lead to a 1988 Lancet paper by Shann and Mulholland could not be confirmed [VERIFY]. Malnourished children may need a threshold about five breaths lower (Falade, read only through a summary) [VERIFY].

How good is the count? Sensitive, not specific, and rough in lay hands. Against X-ray in 110 children, fast breathing had a sensitivity of 74 and a specificity of 67 per cent (Palafox et al 2000, abstract). In 15,029 children pooled, tachypnoea had a sensitivity of 0.92 and a specificity of only 0.22, and lower chest indrawing 0.74 and 0.15 (Rees et al 2020, abstract). Khan and colleagues (2022) pooled 16 studies of non-physicians: only 39 per cent of counts fell within two breaths of the reference and 67 per cent within five, but as a yes-or-no call the lay count had a sensitivity of 78 and a specificity of 86 per cent (abstract). Good enough to sort children, too rough to argue over two breaths. Count again near the threshold.

The signs of a child in danger. In 1,072 Gambian children aged 2 to 33 months with respiratory illness, 63 (5.9 per cent) were hypoxaemic, with oxygen saturation below 90 per cent. They died at 12.7 per cent against 2.6 per cent of the others, a relative risk of 4.6 (Usen et al 1999). I read the full tables. The signs that predicted hypoxaemia were:

Sign	Sensitivity	Specificity
Cyanosis	25%	95%
Nasal flaring	98%	17%
Head nodding	57%	85%
Continuous grunting	46%	86%
Inability to feed	33%	91%
Rate 60 or more	81%	47%
Rate 70 or more	54%	80%
Rate 90 or more	13%	97%
Crackles	86%	30%

Cyanosis is nearly always meaningful when present but is missed in three hypoxaemic children of four. Nasal flaring is present in almost every hypoxaemic child but also in most children who are not. The best combination in the Gambian data was inability to cry, head nodding or a rate of 90 or more, with 70 per cent sensitivity and 79 per cent specificity. The WHO combination of the time (inability to feed or drink, cyanosis, a rate of 70 or more or severe indrawing) reached 80.9 and 62.5 per cent (Usen et al 1999). An earlier Gambian study by Weber and colleagues (1997, read only through Usen) found that cyanosis, head nodding or not crying gave a sensitivity of 59 per cent and

a specificity of 93 to 94 per cent. The library's first report lists "RR above 70 in infant" as a red flag with a [VERIFY] mark (THRIVING library, IN-01). The Gambian data support it as a marker of low oxygen, with the caveat that it catches only about half of hypoxaemic children.

The general danger signs. WHO (2014) defines severe pneumonia, needing referral after the first dose, as cough or difficult breathing with any general danger sign: not able to drink or breastfeed, vomiting everything, convulsions, lethargy or unconsciousness, stridor in a calm child, or severe malnutrition. MSF's paediatric guide adds central cyanosis or saturation below 90 per cent, severe respiratory distress and a child who looks toxic, and admits every child under six months or with severe acute malnutrition (MSF 2024a).

1.4 Diagnosis by hand and ear in adults

Percussion and the ear on the chest. Leopold Auenbrugger published Inventum novum on percussing the chest in Vienna in 1761, neglected until Corvisart translated it in 1808 (History of Medicine n.d.). René Laennec, at the Necker Hospital in Paris in September 1816, rolled paper into a tube to listen to a patient's heart and published De l'auscultation médiate in 1819 (Roguin 2006).

How accurate is the examination? Metlay, Kapoor and Fine (1997) reviewed the bedside diagnosis of pneumonia in adults, summarised by the University of Washington physical diagnosis teaching pages. The likelihood ratio tells how much a finding raises the odds: a ratio of 1 means no help, 2 is a small help, 5 or more is a large one.

Finding	Likelihood ratio if present
Dullness to percussion	2.2 to 4.3
Bronchial breath sounds	3.5
Egophony (the "ee" heard as "ay")	2.0 to 8.6
Decreased breath sounds	2.3 to 2.5
Crackles	1.6 to 2.7
Respiratory rate over 30	2.6
Respiratory rate over 25	1.5 to 3.4
Respiratory rate over 20	1.2

When all the vital signs (pulse, temperature and breathing rate) are normal, the likelihood ratio for pneumonia falls to about 0.18, making it unlikely (read through the same secondary page). Wipf and colleagues (1999) found that examiners agreed with one another only modestly: kappa 0.18 to 0.43 for the overall diagnosis and from minus 0.04 to 0.45 for percussion (read through the same page). The ear and the finger raise or lower suspicion, and the vital signs are the more reliable part. MSF's adult guideline uses a respiratory rate over 30, a pulse over 125, cyanosis, flaring, indrawing and confusion as signs of severity (MSF 2024b).

1.5 Telling pneumonia from its mimics

Bronchiolitis. A viral illness of children up to two years, usually respiratory syncytial virus. Two or three days of runny nose come first, then wheeze and crackles peaking around day three, resolving in 7 to 10 days (MSF 2024a). Fast breathing and indrawing are common, so the WHO count calls many of these children pneumonia. Amoxicillin failure was linked to respiratory syncytial virus in ISCAP (Agarwal et al 2004) and to wheeze in RETAPP (Jehan et al 2020). A child under two with a runny nose first, wheeze and no high fever probably has bronchiolitis, which antibiotics do not help, but one who cannot feed or turns blue is in as much danger as with pneumonia [VERIFY: my synthesis].

Asthma. Wheeze, long breath out, earlier attacks and relief from a bronchodilator. MSF (2024a) treats wheeze as asthma and adds pneumonia treatment only if its signs persist.

Heart failure. In an old person, breathlessness worse lying flat, swollen ankles, crackles at both bases and no fever point to the heart [VERIFY: clinical reasoning]. Pushed fluids harm a failing heart.

Malaria. In the tropics fever and fast breathing come from malaria as often as from pneumonia. O'Dempsey and colleagues (1993) found that among Gambian children brought with suspected pneumonia in the high malaria season, 33 per cent had radiological pneumonia and 38 per cent had malaria parasites without pneumonia. In the low season the figures were 48 and 6 per cent (abstract). Malarial acidosis drives fast deep breathing without a chest infection. Where malaria exists, the honest answer without a test is to treat both, as WHO and MSF do, and IN-02 covers the malaria side.

Tuberculosis and the rest. Cough with fever for more than two weeks should raise tuberculosis (MSF 2024a, MSF 2024b). A child who chokes on a bean and then coughs may have an inhaled foreign body. HIV changes everything: an HIV-positive child with indrawing is referred (WHO 2014), and Hesperian's cotrimoxazole course of 21 days is for Pneumocystis in HIV, not for ordinary pneumonia (Hesperian n.d.).

1.6 Community case management and the village antibiotic

Does treating at the doorstep save lives? Sazawal and Black (2003) pooled nine community trials, seven with concurrent controls, none individually randomised. Community treatment cut total mortality by 27 per cent in newborns, 20 per cent in infants and 24 per cent at 0 to 4 years, and pneumonia mortality by 42, 36 and 36 per cent (abstract). At Gadchiroli in Maharashtra, Abhay and Rani Bang trained village workers to count breaths and give co-trimoxazole in 58 villages against 44 controls (Bang et al 1990, abstract). Case fatality in 612 treated children was 0.8 per cent against 13.5 per cent, and under-five mortality 28.5 against 40.7 per 1,000, at a drug cost of US$0.025 per child a year. The library's first report calls the drug "oral antibiotics" (THRIVING library, IN-01). The abstract names co-trimoxazole, likely to be found in salvaged stock.

Which drug and how much? The trials converge on oral amoxicillin, with co-trimoxazole as a near-equal second. In 1,471 children with non-severe pneumonia, amoxicillin 25 mg/kg twice daily and co-trimoxazole (4 mg/kg trimethoprim with 20 mg/kg sulfamethoxazole) twice daily for five days failed in 16.1 and 18.9 per cent respectively, judged equivalent (Catchup Study Group 2002). The Cochrane review of 29 trials and 14,188 children found an odds ratio for failure of 1.18 (0.91 to 1.51) for amoxicillin against co-trimoxazole, and that oral treatment was as good as injection in severe pneumonia without hypoxaemia, odds ratio 0.84. Chloramphenicol did worse than penicillin with gentamicin (Lodha et al 2013). In Pakistan, 2,037 children with chest indrawing treated at home with oral amoxicillin at 80 to 90 mg/kg a day in two doses for five days failed in 7.5 per cent, against 8.6 per cent of those given injected ampicillin in hospital, with five deaths in all (Hazir et al 2008).

Dose. The sources disagree, and the brief's figure of 40 to 50 mg/kg a day in two doses needs correction. WHO (2014) recommends 80 mg/kg a day in two doses (40 mg/kg per dose) for five days, or three days for fast breathing in low-HIV areas. With 250 mg dispersible tablets that is one tablet twice daily at 4 to under 10 kg, two at 10 to under 14 kg and three at 14 to 19 kg, simplified for community workers to one tablet under 12 months and two from 1 to 5 years. The library's first report follows WHO (THRIVING library, IN-01). MSF (2024a) gives 30 mg/kg three times daily. Hesperian (n.d.) gives 22 to 25 mg/kg twice daily, the source of the brief's figure and the dose used in the Catchup trial. The randomised CAP-IT trial in 824 British children found 35 to 50 mg/kg a day non-inferior to 70 to 90 mg/kg a day (re-treatment 12.6 against 12.4 per cent), though slightly worse in severe pneumonia (17.3 against 13.5 per cent) (Bielicki et al 2021). The village should use the WHO dose while stock lasts and know that half of it is a defensible fallback for mild cases.

Duration. In ISCAP, 2,188 Indian children, three days of amoxicillin cured 89.5 and five days 89.9 per cent, with better adherence on three (Agarwal et al 2004). CAP-IT agreed (Bielicki et al 2021).

Does fast breathing alone need an antibiotic? The RETAPP trial in Karachi randomised 4,002 children aged 2 to 59 months with fast breathing and no danger signs to placebo or amoxicillin for three days (Jehan et al 2020).

Treatment failed in 4.9 per cent on placebo and 2.6 per cent on amoxicillin, a number needed to treat of 44 (31 to 80). One child died in each arm. Fever and wheeze predicted failure. Where stock is scarce, the child with fast breathing only, no fever and a wheeze can be watched closely without a drug, and treated at once if fever, indrawing or a danger sign appears [VERIFY: the stewardship rule is my inference from RETAPP, and the trial was done where a clinic was within reach].

Young infants under two months. WHO's 2015 guideline treats fast breathing alone at 7 to 59 days with oral amoxicillin for seven days, and clinical severe infection with amoxicillin plus intramuscular gentamicin when referral is impossible. Infants of 0 to 6 days with fast breathing are referred (North et al 2024). The AFRINEST trial in 1,451 infants used amoxicillin 100 mg/kg a day in two doses for seven days and found it equivalent to injections (via North et al 2024). Both rest on one evidence base [VERIFY].

Adults. MSF (2024b) gives amoxicillin 1 g three times daily for five days (children over five, 30 mg/kg three times daily, maximum 3 g a day), reassessed at 48 to 72 hours, and ceftriaxone with oxygen for severe cases. A secondary summary attributes the same adult regimen to NICE, which I could not open [VERIFY].

1.7 When there is no antibiotic: the nursing regimen

The pre-antibiotic physicians knew they could not change the course of lobar pneumonia. Osler wrote in 1892 that it was "a self-limited disease" that "is uninfluenced in any way by medicine". What they could do was keep the patient alive to the crisis. The regimen below combines what they did with what modern evidence keeps.

Position. Sitting up or half sitting eases breathing. Hesperian (n.d.) advises a sitting or halfway sitting position and raising the head of the sleeping mat at night. MSF (2024a) teaches carers to hold a child upright at 30 degrees after feeds. Osler and McCrae (1916) recommended "a comfortable position" and fresh air as the best aids to breathing.

Fluids and feeding. The old physicians gave water and lemonade freely, and milk, broths, cereals and eggs (Osler 1892, Osler and McCrae 1916). Hesperian (n.d.) says to give plenty of fluids and food and to breastfeed babies often. MSF (2024a) adds a modern caution: pneumonia makes the body hold water through raised antidiuretic hormone, so fluids should be adequate rather than pushed, restriction considered in severe cases, and a child in severe distress kept nil by mouth for 24 hours and then given small frequent feeds. In MSF's guide the daily maintenance requirement is 100 ml/kg for the first 10 kg of body weight, 50 ml/kg for the next 10 kg and 20 ml/kg for each kg above that, and in meningitis and cerebral malaria MSF restricts to 70 per cent of maintenance. The village can use maintenance as the ceiling, not the target, for a child with severe pneumonia who is drinking [VERIFY: applying the 70 per cent restriction to pneumonia is my inference].

Warmth, cooling and fresh air. Osler (1892) used ice bags and sponging above 103°F, and Osler and McCrae (1916) cold sponging every three hours or a cold compress jacket changed hourly. They wanted the patient warm in body and cold in air: a blanket, a hot-water bag and a flannel jacket in a bright, ventilated room with no more than one or two people.

The open-air ward. In the 1918 influenza pandemic the Massachusetts State Guard put up Camp Brooks Open Air Hospital at Corey Hill, Brookline, in 13 tents in seven hours (Hobday and Cason 2009). From 9 September to 12 October 1918 it took 351 sick sailors, a third with pneumonia, and 36 died, about 10 per cent. Patients lay outdoors day and night with hot-water bottles and extra blankets and were fed every few hours. One contemporary estimate claimed the regimen cut case fatality from 40 to about 13 per cent. Hobday and Cason call the benefit "uncertain", since hygiene and masks may explain it. Grade D for survival, C for protecting staff [VERIFY].

Pain and cough. Osler and McCrae (1916) gave morphia 1/4 grain (about 16 mg) for the pleuritic stitch and codeine 1/2 grain for cough. A small opiate dose for pain that prevents sleep is defensible in adults, never in children (see the harm test). MSF uses paracetamol (MSF 2024b).

What the old regimen did that harmed. Osler (1892) advised bleeding 20 to 30 ounces early in a robust patient, yet recorded that of 12 late cases bled only one recovered. He gave 4 to 20 ounces of whisky a day and strychnine, called expectorants "rarely of any value" and quinine of doubtful value. None should survive into the village regimen.

Steam. Heated humidified air showed no clear benefit for colds in six trials with 387 participants (Singh et al 2017). Baartmans and colleagues (2012) found about three burn-centre admissions a year in the Netherlands from steam inhalation, mostly children, who needed grafts more often, and urged that it be dropped from guidelines. The library's first report keeps steam in its ledger (THRIVING library, IN-01). I would drop it for children.

Honey for cough. In six trials with 899 children aged 12 months to 18 years, honey reduced cough frequency more than no treatment or placebo and about as much as dextromethorphan, mostly over one night (Oduwole et al 2018). It treats the cough of a cold, not pneumonia. Never under 12 months, because of infant botulism (Awad et al 2025, abstract, and Poison Control, search summary).

1.8 The traditional chest remedies

The brief's warning is correct and central: most traditional chest remedies were given for bronchitis and colds, which get better on their own, and their reputation was earned there. Lobar pneumonia has a 20 to 40 per cent adult mortality untreated, and nothing in this section has been shown to change it.

Mustard plasters. Black mustard (Brassica nigra, seed) or white mustard (Sinapis alba, seed), ground and mixed with flour and water, laid on the chest as a counter-irritant. Tradition says it draws congestion out. The record shows no trial. Modern science knows the irritant is allyl isothiocyanate released when the seed is wetted, which reddens the skin and can blister it. Case reports describe second-degree burns from a mustard-seed plaster on the knee (Yabanoglu et al 2012), from mustard powder (Tartar and Sharon 2017, abstract) and from a mustard and honey wrap left for about 15 minutes (Deutsches Ärzteblatt 2017, read only as a summary) [VERIFY]. The common thread is application for longer than the traditional few minutes. Grade D for comfort, X for treating pneumonia, with a definite burn risk.

Onion and garlic poultices. Onion (Allium cepa, bulb) and garlic (Allium sativum, bulb) cooked and laid on the chest. Old American household books gave pneumonia recipes with onions, vinegar and rye meal applied as hot as could be borne (Pioneer Farms 2015, reprinting an 1881 guide). I found no clinical study. Raw garlic laid on skin is a known cause of chemical burns [VERIFY: not sourced in this report]. Grade D for comfort, with heat and garlic burn risk. Osler and McCrae (1916) said hot poultices relieved pain no better than cold ones, but that "for children they are often preferable", which is a fair verdict on comfort without cure.

Elecampane. Inula helenium, root, of the daisy family (Asteraceae). A long European tradition as an expectorant for chest complaints. In the laboratory, alantolactone and isoalantolactone from roots naturalised in Ireland showed activity against Staphylococcus (Kenny et al 2022). The Drugs.com monograph found no clinical trials and no established dose, and lists allergy in people sensitive to the daisy family, contact dermatitis and irritation of the mucous membranes (Drugs.com n.d.). Grade D. I found no source naming its lookalikes. Before it flowers, its large basal leaves could be mistaken for those of foxglove (Digitalis purpurea), which is deadly, so it should be dug only from a plant seen in flower [VERIFY: my inference].

Thyme. Thymus vulgaris, herb (leaf and flowering top). Two German trials by Kemmerich and colleagues tested fixed combinations in adults with acute bronchitis. A thyme and ivy syrup (5.4 ml three times daily for 11 days) in 361 patients reduced coughing fits by 68.7 per cent against 47.6 per cent on placebo (Kemmerich et al 2006, abstract), and a thyme and primrose root combination in 361 patients by 67.1 against 51.3 per cent (Kemmerich 2007, abstract via search). These are bronchitis trials with industry products, so they support thyme for the self-limiting cough, not for pneumonia. Grade B for bronchitis cough, D for pneumonia. Thyme is a common culinary herb and low risk as a tea [VERIFY: safety as tea not separately sourced].

Ma Xing Shi Gan Tang. Ephedra (Ephedra sinica, stem), bitter apricot kernel (Prunus armeniaca, seed), gypsum

and liquorice (Glycyrrhiza uralensis, root). A 2025 meta-analysis of 81 Chinese randomised trials with 6,682 patients, where the formula was added to Western treatment including antibiotics, found fever shorter by 1.58 days, cough by 2.30 days and hospital stay by 1.38 days, with adverse events 3.60 against 5.38 per cent, at moderate or low certainty (Ling et al 2025). Dose-comparison trials in children found that dose mattered (An et al 2023, abstract), and a non-blinded H1N1 trial of a combined formula shortened fever (Wang et al 2011, abstract). Nothing tests it without an antibiotic. Grade B as an adjunct, D alone.

Two ingredients are dangerous. Haller and Benowitz (2000) reviewed 140 FDA reports of harm from ephedra supplements, including 17 cases of hypertension, 10 strokes and 7 seizures, with 10 deaths and 13 permanent disabilities. Bitter apricot kernels release cyanide: the European Food Safety Authority set an acute reference dose of 20 micrograms per kilogram, with a lethal dose of 0.5 to 3.5 mg/kg, and one small raw kernel exceeds the safe dose in a toddler (EFSA 2016, read through summaries). Whether decoction removes the risk is unknown to me [VERIFY].

1.9 Aspiration pneumonia in the bedridden

The old, the stroke-paralysed, the drunk and the unconscious inhale mouth contents and develop pneumonia from the bacteria of the mouth, often in the right lower lobe [VERIFY]. MSF (2024a) treats suspected aspiration with ceftriaxone plus metronidazole 10 mg/kg every eight hours, or amoxicillin-clavulanic acid. Prevention is mostly nursing. A 2013 systematic review in Gerodontology of non-ventilated frail older people in hospitals and care homes found that better oral care reduced the risk of aspiration pneumonia and of dying from it, and recommended brushing the teeth after every meal and cleaning dentures daily, though only five studies qualified (van der Maarel-Wierink et al 2013, read only as a summary). Raising the head of the bed to about 30 degrees is standard for ventilated patients but rests on weak evidence even there, and has not been tested in bedridden non-ventilated elders (Cochrane CD009946 n.d., read only as a summary) [VERIFY]. For the village this means: sit the bedridden up to eat, feed slowly in small mouthfuls, keep them upright for half an hour after, clean the mouth after every meal, and never feed someone who is drowsy or coughing at every swallow [VERIFY: the practical rule is my synthesis].

2. Evidence grades

Tradition is what the practice claims, record is what the series and trials showed, inference is what modern science adds.

Remedy or practice	Grade	Tradition, record, inference
Amoxicillin for child pneumonia	A	Trials and Cochrane (Lodha et al 2013, Hazir et al 2008, Bielicki et al 2021)
Co-trimoxazole for child pneumonia	A	Equivalent to amoxicillin (Catchup 2002), basis of Gadchiroli
Sulfonamides or penicillin in adults	B	Pre-antibiotic comparisons, 16 to 26 points fewer deaths (Spellberg et al 2008)
Community case management	A/B	Non-randomised trials, consistent (Sazawal and Black 2003)
Counted breath and danger signs	A/B	Validated, sensitive, not specific (Usen et al 1999, Rees et al 2020)
Percussion and auscultation	B	Raise or lower suspicion, poor agreement (Metlay et al 1997)
Upright position, small feeds	C	Universal nursing advice, plausible, not trialled for survival

Remedy or practice	Grade	Tradition, record, inference
Fluids to maintenance, not beyond	C	Old regimen pushed fluids, modern caution about water retention
Open-air ward	D	One uncontrolled 1918 series, plausible for staff protection
Cold sponging for fever	D	Comfort only
Honey for cough, over 12 months	A (cough of colds)	Cochrane, not tested in pneumonia
Steam inhalation	X (children)	No benefit for colds, documented burns
Mustard plaster	D comfort, X cure	Counter-irritant, burns
Onion or garlic poultice	D	No study, heat and garlic burns
Elecampane root	D	Laboratory activity only
Thyme	B (bronchitis), D (pneumonia)	Two industry trials in bronchitis
Ma Xing Shi Gan	B adjunct, D alone	Chinese trials with antibiotics, ephedra and cyanide risks
Bleeding	X	Osler's 12 late bled, 1 survived
Alcohol, strychnine, expectorants	X	No benefit in the record, harm in the old
Opiate cough mixtures in infants	X	Deaths documented (see harm test)
Serum therapy	B, not feasible	Type I mortality halved (Podolsky 2005)

3. Means ledger

Rung	Diagnosis	Treatment	What it changes
Hands and knowledge	Count breaths for a full minute, look for indrawing, flaring, grunting, blue lips, inability to drink	Position upright, breastfeed, small drinks, keep warm in fresh air, watch for the crisis	Finds the child in danger early. Survival as in the pre-antibiotic record, roughly 20 to 40 per cent adult hospital mortality, less in the young and fit
Hearth	As above, plus a timer (a pendulum of fixed length or a counted song) [VERIFY]	Boiled water, broths, honey for cough over 12 months, cool sponging, a clean bed	Comfort and hydration, no proven change in mortality
Garden and still	As above	Thyme tea for the bronchitic cough, Ma Xing Shi Gan only as an adjunct and only by someone who knows ephedra	Shorter cough in bronchitis. No change in pneumonia mortality without antibiotic
Village dispensary (300)	A trained lay healer with a watch, chart and record book, malaria test if salvaged	Amoxicillin or co-trimoxazole by weight band, first dose given in front of the healer, review at 48 hours	The Gadchiroli effect: case fatality from about 13.5 to under 1 per cent in children (Bang et al 1990)

Rung	Diagnosis	Treatment	What it changes
District infirmary (3,000)	Nurse or doctor, stethoscope, perhaps an oximeter, microscope for malaria and sputum	Injectable ampicillin and gentamicin or ceftriaxone, oxygen from a salvaged concentrator if power exists, nasogastric feeding	Treated severe pneumonia, aspiration and infants under two months
Hospital before the Fall	X-ray, oximetry, blood culture, oxygen, ventilation	Full regimen	In the typical case, little better than oral antibiotic (Spellberg et al 2008). The gain is in hypoxaemic and very sick patients

A village of 300 can expect about 45 children under five and, at 0.28 episodes per child a year, about 13 child pneumonias a year (THRIVING library, IN-01). At WHO doses a five-day course for a 10 kg child uses about 20 tablets of 250 mg, so 300 tablets cover the children for a year [VERIFY: my arithmetic, adults not included].

4. Harm test

Antibiotics. Amoxicillin causes rash and diarrhoea, and rarely anaphylaxis in the penicillin-allergic. Co-trimoxazole can cause severe skin reactions and blood disorders, and should not be given in the first weeks of life because sulfonamides displace bilirubin in the newborn [VERIFY: Hesperian starts it at six weeks, but the reason is not stated there]. Sulfapyridine in 1938 turned a quarter of intensively treated patients blue with methaemoglobin (Evans and Gaisford 1938), and later reports described agranulocytosis (secondary). The great harm is not the drug but its waste: a course given to every cough leaves none for the child with indrawing, and the penicillin-resistant pneumococcus rose from 3.6 to 24 per cent in eleven years in the United States (Podolsky 2005). Gentamicin, at the district only, damages hearing and kidneys if overdosed [VERIFY].

Opium and codeine. Victorian "soothing syrups" killed infants in numbers no one counted. Mrs Winslow's Soothing Syrup, made in Bangor, Maine, from 1849, held about 65 mg of morphine per ounce, and one teaspoon could kill a child (Berger 2019, secondary). In 1847 an inquest at North Marston recorded the death of an eleven-week-old given Godfrey's Cordial and poppy-head tea, and the verdict was natural death (North Marston History n.d.). Today codeine is contraindicated for cough in children under 12: the American FDA review behind the 2017 change found 64 cases of respiratory depression and 24 deaths in children, 21 of them under 12, because some children convert codeine to morphine very fast (read through Oliveira e Silva et al 2021 and news summaries). Rule: no opiate of any kind for a child's cough. In adults, an opiate dulls the cough that clears the chest and the breathing of the exhausted, so give the smallest dose for pain that prevents sleep, never for cough alone [VERIFY].

Steam. Scalds to face, chest and lap when a bowl is knocked over. Children need grafting more often (Baartmans et al 2012). Signs: blistering, white or leathery skin. Cool under running water and see IN-01's burn guidance.

Mustard, garlic and hot poultices. Blisters and full-thickness burns, worst in infants, the old, the unconscious and anyone who cannot complain. Never leave a plaster on a sleeping patient, and lift it at once if the skin is more than pink [VERIFY: the timing rule is traditional, not trialled].

Ma Xing Shi Gan. Ephedra: palpitations, high blood pressure, stroke and seizures, and deaths in supplement users (Haller and Benowitz 2000). Never in heart disease, high blood pressure, pregnancy or the old. Apricot kernel: cyanide poisoning, with headache, vomiting, confusion and collapse (EFSA 2016). Never use raw kernels and never let children eat them.

Honey. Infant botulism under 12 months: constipation, drooping eyelids, a weak suck and floppiness, which may appear weeks after the honey (Awad et al 2025, Poison Control summary).

Fluids. Pushed fluids in severe pneumonia or a failing heart drown the lungs. Signs: puffy eyelids, swelling, worsening breathlessness lying flat (MSF 2024a) [VERIFY: signs are general clinical knowledge].

Misdiagnosis. Malaria called pneumonia kills through untreated malaria, and the reverse (O'Dempsey et al 1993). Tuberculosis treated as pneumonia for weeks spreads to the household.

5. Red flags

These signs mean the patient will probably die or be harmed without what the village may not have: oxygen, injectable antibiotics, a hospital.

- Blue lips or tongue (central cyanosis). Specific for low oxygen but missed in three of four (Usen et al 1999).
- A child who cannot drink or breastfeed, vomits everything, is unusually sleepy or cannot be woken, or has a convulsion (WHO 2014).
- Grunting with every breath, head nodding, inability to cry, a rate of 70 or more in an infant (Usen et al 1999).
- Exhaustion: a breathing rate that falls while the child or adult looks worse, quiet breathing with indrawing, confusion in an adult. A falling rate in a tiring patient is not recovery [VERIFY: clinical reasoning].
- Any infant under two months with fast breathing or indrawing (North et al 2024).
- Severe malnutrition with cough (WHO 2014).
- In an adult: rate over 30, pulse over 125, confusion, blue lips (MSF 2024b).
- The bedridden who coughs at every swallow, gurgles after feeds or develops fever after choking (aspiration).
- No improvement at 48 to 72 hours on antibiotic (Spellberg et al 2008, MSF 2024a). Think of empyema, tuberculosis, malaria, wrong drug or no drug taken.

What to do anyway: give the first dose of antibiotic if any exists, sit the patient up, keep the airway clear, give small sips or breast milk, keep the room cool and airy and the patient warm, send for the district if it can be reached, and record the time of every change. When nothing more can be done, honest comfort is part of the regimen. The old physicians gave morphia to the dying adult for distress, and that remains defensible in an adult at the end. A parent should hold the child upright, the room should be quiet, and the family should be told plainly that the crisis may come on the seventh to tenth day or may not come.

6. The case against

Against the counted breath. Rees and colleagues (2020) showed that tachypnoea has a specificity of 0.22 against X-ray, so most children treated under the WHO rule do not have X-ray pneumonia. The RETAPP trial (Jehan et al 2020) found that 44 children with fast breathing alone must be treated to prevent one treatment failure, and none to prevent a death in that trial. Khan and colleagues (2022) found that lay counts are "relatively poor". In a world without new antibiotics, the WHO rule spends stock on children who would recover.

Against community case management as proven. Sazawal and Black's trials were not randomised, and Gadchiroli's comparison group was not concurrent for every figure (abstract). The 24 per cent mortality reduction may be inflated by the attention that trial villages received.

Against the pre-antibiotic record as a guide. Spellberg and colleagues (2008) built their argument for placebo-free trials on historical controls that are open to every bias of comparing different decades, wards and doctors. The concurrently controlled gain (16 points) is smaller than the historical one (26 points).

Against the romance of the herbal. The traditional chest remedies were given to coughs that would have got better anyway. No herb in this report has been shown to reduce pneumonia mortality. The best evidence for Ma

Xing Shi Gan comes from Chinese trials in which it was added to antibiotics, and such trials have been criticised for poor reporting (Ling et al 2025 rated certainty moderate or low).

Against the romance of the hospital. Osler's charity wards killed a quarter of their patients, bled them, gave them whisky and crowded them together. In the typical case, treated mortality of the 1940s equals today's (Spellberg et al 2008).

Leading critics. Spellberg's group on historical controls, Jehan and Rees on overtreating fast breathing, Reimann (via Podolsky 2005) on antibiotic waste, Baartmans on steam.

7. 10-line summary

1. Untreated lobar pneumonia killed about 20 to 40 per cent of hospital adults, about 1 in 10 under 30 and over half over 60.
2. The fever usually broke by crisis on day 5 to 10, and the regimen's job was to carry the patient there.
3. Sulfonamides and penicillin cut adult mortality by about 16 to 26 points, and treated mortality has hardly fallen since.
4. A fever that has not settled 72 hours after the first dose needs a new diagnosis.
5. A counted minute of breaths and a look for indrawing find the children who need treatment, at the cost of treating many who do not.
6. Cyanosis, inability to drink, grunting and head nodding mark the child with too little oxygen.
7. Oral amoxicillin at home is as good as injection in pneumonia without hypoxaemia, and co-trimoxazole nearly as good.
8. Three days are enough for fast breathing alone and five for indrawing, and half the WHO dose may do for mild cases.
9. Upright position, small feeds, careful fluids, fresh air and warmth are the nursing, and steam, opiates in children and bleeding are harms.
10. No traditional chest remedy has been shown to change pneumonia mortality.

8. Open questions

- Whether a village should treat fast breathing without fever or indrawing at all, given RETAPP's NNT of 44, or keep its antibiotic for indrawing and danger signs.
- What fraction of the pre-antibiotic mortality was due to bleeding, alcohol and crowding rather than the disease itself.
- Whether the open-air ward reduces mortality or only staff infection.
- The right fluid volume for a child with severe pneumonia at home.
- Whether Ma Xing Shi Gan has any effect without an antibiotic, and at what ephedra dose it is safe.
- How long salvaged amoxicillin and co-trimoxazole tablets stay potent past their date (for IN-05).
- How accurate a pendulum or counted song is as a timer for lay breath counts [VERIFY].

9. Sources to read in full

1. Spellberg B et al 2008, for the whole pre-antibiotic record in one place.
2. Osler W 1892, the lobar pneumonia chapter.
3. Evans GM, Gaisford WF 1938, the first controlled trial of a pneumonia drug.
4. WHO 2014 policy brief, for doses by weight band.
5. Usen S et al 1999, for which signs mean low oxygen.
6. Jehan F et al 2020 (RETAPP) and Bielicki JA et al 2021 (CAP-IT), for stewardship.
7. MSF 2024a, section 4.5, for the modern paediatric regimen.

8. Podolsky SH 2005, for serum, sulfa and the rise of resistance.
9. Hobday RA, Cason JW 2009, for the open-air ward.

10. At the bedside after the Fall

Household. Minimum: a clock or a fixed timer, the three thresholds written on the wall, a chair or bolster to sit the patient up, clean water and broth, honey for coughs over 12 months, blankets and an airy room. Skill: counting breaths with a hand on the belly, recognising indrawing and blue lips. Record: day of illness and temperature, so the crisis can be expected. First failure to expect: the anxious parent counts a crying child and gets 60, or counts a sleeping child for 15 seconds and multiplies, and treats or panics on a wrong number.

Village of 300. Minimum: one trained lay healer, a chart of weight bands, a hanging scale, a stock of amoxicillin 250 mg dispersible tablets (about 300 a year for children) and co-trimoxazole as reserve, a malaria test if any can be salvaged, and a register of every case with date, rate, signs, dose and outcome at 48 hours. Garden: thyme and honey for coughs. First failure to expect: the stock is used for coughs and colds in the first winter and is gone when the child with indrawing comes.

District of 3,000. Minimum: a nurse or doctor, stethoscope, oximeter and an oxygen concentrator if power can be kept, injectable ampicillin, gentamicin and ceftriaxone, nasogastric tubes, a microscope for malaria and tuberculosis, and an open-air or well-ventilated ward with beds two metres apart [VERIFY: spacing is my inference]. First failure to expect: oxygen supply fails with the power, and the infirmary must fall back on position and nursing.

11. Protocols

Protocol 1. Count, look, listen (any age). - [ ] Calm the patient. Do not count a crying or feeding child. - [ ] Bare the chest. Rest a hand on the belly or watch the chest. - [ ] Count breaths for a full 60 seconds by a clock. One person times, one counts. - [ ] If within 5 breaths of a threshold, count again after 10 minutes. - [ ] Fast if: under 2 months 60 or more, 2 to 12 months 50 or more, 1 to 5 years 40 or more, adult over 30 (severe). - [ ] Look for: lower chest wall pulling in when breathing in, nostrils flaring, grunting, head nodding, blue lips or tongue. - [ ] Ask: can the child drink or breastfeed, vomits everything, convulsions, unusually sleepy. - [ ] Listen (adult): tap the back on both sides from top to bottom, compare. A dull note on one side and harsh breath sounds there raise suspicion. Normal pulse, temperature and breathing make pneumonia unlikely. - [ ] Ask about malaria, wheeze, runny nose first, cough over 2 weeks, choking, swollen ankles. - [ ] Write it down with the date and time.

Protocol 2. Decide and dose (child 2 months to 5 years). - [ ] Any danger sign, blue lips or severe malnutrition: give first dose of amoxicillin, send to the district now. - [ ] Indrawing without danger signs: amoxicillin at home for 5 days. - [ ] Fast breathing only: amoxicillin for 3 days. If stock is short and the child has no fever but wheezes, watch closely and treat if worse [VERIFY]. - [ ] Dose amoxicillin 40 mg/kg twice a day (tolerance 35 to 45 mg/kg). With 250 mg tablets: 4 to under 10 kg, 1 tablet twice a day. 10 to under 14 kg, 2 tablets twice a day. 14 to 19 kg, 3 tablets twice a day (WHO 2014). Lower fallback in mild cases: 25 mg/kg twice a day (Catchup 2002, Bielicki et al 2021). - [ ] If no amoxicillin: co-trimoxazole 4 mg/kg trimethoprim with 20 mg/kg sulfamethoxazole twice a day for 5 days (Catchup 2002) [VERIFY: single trial source]. Not under 6 weeks. - [ ] Give the first dose in front of you. Dissolve the tablet in a little breast milk or water. - [ ] Malaria area and no test: treat malaria as well (see IN-02). - [ ] Review at 48 hours. Better: finish the course. Same: check the dose was given, think of malaria and wheeze. Worse: send to the district.

Protocol 3. Young infant under 2 months. - [ ] Any fast breathing in the first week of life, any indrawing, poor feeding, fever or cold body: refer at once. - [ ] Fast breathing only at 7 to 59 days with no referral possible: amoxicillin 50 mg/kg twice a day for 7 days (AFRINEST, via North et al 2024) [VERIFY: one evidence base]. - [ ] Keep the baby skin to skin and at the breast.

Protocol 4. Adult or child over 5. - [ ] Non-severe: amoxicillin 1 g three times a day for 5 days in adults, 30 mg/kg three times a day in children, maximum 3 g a day (MSF 2024b) [VERIFY: second source not opened]. - [ ] Reassess at 48 to 72 hours. Fever not falling by 72 hours: think of empyema, tuberculosis, malaria. - [ ] Rate over 30, pulse over 125, confusion or blue lips: first dose and refer.

Protocol 5. Nursing with or without a drug. - [ ] Sit the patient up or half up. Raise the head of the bed. Infants upright at 30 degrees after feeds. - [ ] Fluids: small frequent drinks to roughly maintenance (100 ml/kg a day for the first 10 kg, 50 ml/kg for the next 10, 20 ml/kg for each kg above), no more (MSF 2024a). In severe breathlessness, very small sips only. - [ ] Feed little and often. Keep breastfeeding. - [ ] Fever: sponge with tepid water. Paracetamol if available. - [ ] Fresh air: open the window, keep the patient warm with blankets, no more than two people in the room. - [ ] No steam bowls near children. No opiates for a child's cough. No honey under 12 months. No raw apricot kernels. No bleeding. - [ ] Chart temperature and breath rate morning and evening. Expect the crisis between day 5 and 10, and watch for the false crisis on day 5. - [ ] After the crisis, keep the patient in bed and fed for several days. Sweating and weakness are expected.

Protocol 6. Preventing aspiration in the bedridden. - [ ] Sit fully upright to eat, small mouthfuls, slowly. - [ ] Stay upright 30 minutes after meals. - [ ] Clean teeth and mouth after every meal, dentures daily (van der Maarel-Wierink et al 2013). - [ ] Do not feed the drowsy. Stop if coughing at every swallow.

12. Numbers to carry

1. Fast breathing: 60 under 2 months, 50 at 2 to 12 months, 40 at 1 to 5 years, 30 in adults is severe.
2. Count a full minute, calm child, twice if near the line.
3. Untreated adult pneumonia: 1 in 10 dies under 30, 1 in 3 in middle age, over half over 60.
4. The crisis: day 5 to 10. With a working drug, fever falls in 2 to 3 days.
5. Amoxicillin 40 mg/kg twice a day, 3 days for fast breathing, 5 for indrawing.
6. Blue lips, cannot drink, grunting, convulsion: first dose and refer.
7. Review every treated child at 48 hours.
8. No opiate for a child's cough, no honey under 12 months, no steam bowl near a child.

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