MA-07 The sick child: danger signs, diarrhoea, pneumonia and malnutrition by hand

HEALING after the FALL, research library, MA-07

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

How to read this report

This report covers the child from two months to five years. The young infant belongs to MA-05, feeding without the breast to MA-06, the oral rehydration recipe and plans to HY-03, refeeding and the F-75 and F-100 recipes to HY-09, the adult chest to IN-03, and measles, whooping cough and diphtheria to IN-12. Fever and febrile seizures are in IN-02, malaria in IN-09, dysentery in IN-11, antibiotic stock in IN-05. Those are cited, not repeated. What is new here is the child-specific layer: the IMCI algorithm and how well lay hands run it, what the danger signs predict, the trials that moved pneumonia treatment from injection to tablet and from clinic to doorstep, newer zinc and feeding evidence, what kills a malnourished child in the first two days, village therapeutic food and its aflatoxin problem, and the traditional treatments that harm. Tradition, record and inference are kept apart. Where I read only an abstract or a search summary, the reference says so.

Findings by section

1. The baseline: childhood before medicine

The record. Volk and Atkinson (2013) pooled 20 hunter-gatherer and 43 historical populations. About 27 per cent of infants died in the first year and close to half of all children before puberty: 26.8 and 48.8 per cent in the hunter-gatherer sample (read through Roser n.d., not the paper). In Sweden from 1750 to 1780, 40 per cent of children died before 15, in France about 45 per cent and in a Bavarian village about half. Through to 1800, more than one child in three died before five (Roser n.d.).

The bias. These figures are probably too low. Parish registers missed infants who died before baptism, small skeletons decay, and the authors call their own estimates conservative (Roser n.d.). Hospital series of the 1930s carry the opposite bias: they describe children who reached a hospital.

For the village. A village of 300 has about 45 children under five and under a pre-modern regime loses three or four of them a year (THRIVING library, IN-01). Pneumonia, diarrhoea, malaria, measles and the malnutrition that makes each lethal cause most of those deaths. Three of these can be treated by hand with salt, sugar, a tape, a clock, a stock of tablets and food.

2. IMCI: the best-tested algorithm for lay hands

What it is. WHO and UNICEF built the Integrated Management of Childhood Illness in the 1990s because sick children seldom have one disease, and because a worker with nine to eleven days of training needs one path through

cough, diarrhoea, fever and nutrition (Gove 1997). It sorts each child into pink (refer urgently), yellow (treat at home with a drug) or green (home care) and ties each class to a drug, a dose and a follow-up day (WHO 2014).

How well it sorts. In the Gambia, a trained field worker against a paediatrician with laboratory and X-ray detected pneumonia with 81 per cent sensitivity and 89 per cent specificity, dehydration with 67 and 96, and malnutrition with 89 and 90 (Weber et al 1997, abstract). In Gondar, Ethiopia, six workers after nine days of training classified pneumonia at 88 and 87 per cent and diarrhoea with dehydration at 76 and 98, but febrile illness at only 39 per cent sensitivity (Simoes et al 1997, abstract).

How lay workers run it. In Malawi in 2009, 131 Health Surveillance Assistants were watched treating 382 sick children, each re-examined by a clinician (Gilroy et al 2013). They asked the three danger-sign questions in 56 per cent of children but checked the four physical danger signs in only 37 per cent. Only 30 per cent of breath counts in fast-breathing children fell within two breaths of the clinician's. Only 55 per cent of children with a danger sign were referred, and 52 per cent with cough and fast breathing got the right antibiotic. The authors call this a best case: strong districts, workers who knew they were watched.

Does it save lives? Less than its builders hoped. In Matlab, Bangladesh, 20 facility catchments covering about 350,000 people were randomised. The yearly fall in under-five mortality was 8.6 per cent with IMCI and 7.8 without, not significantly different (Arifeen et al 2009, abstract). The Cochrane review pooled a relative risk for child mortality of 0.85 (0.78 to 0.93), low certainty (Gera et al 2016, in THRIVING library, FO-06). The parts (antibiotic, ORS, therapeutic food) have stronger evidence than the package.

Inference. The chart lets a careful person with a clock sort a child into three bins and act. Its weakness is that the physical signs (indrawing, lethargy, skin pinch, breath count) are exactly what untrained hands skip. The book should teach those signs by supervised repetition, not reading alone. Grade B.

3. The general danger signs and what they predict

The signs. For every sick child from two months, IMCI first asks: can the child drink or breastfeed, does the child vomit everything, has the child had convulsions in this illness, and is the child lethargic or unconscious now. Any one means very severe disease: diazepam if convulsing, first antibiotic dose, prevent low blood sugar, keep warm, refer urgently (WHO 2014).

What they predict. I found no study reporting the sensitivity of each of the four signs for death at 2 to 59 months. The evidence comes in pieces.

- In 466 febrile Tanzanian children, inability to drink carried an odds ratio for death of 8.9 (4.0 to 19.6), lethargy 5.2, capillary refill over 3 seconds 9.0 (Clifton et al 2012, in THRIVING library, FO-07).
- In 920 severely malnourished children at Kilifi, Kenya, the WHO danger signs (lethargy, hypothermia, hypoglycaemia) predicted death within 48 hours with 52 per cent sensitivity and 84 per cent specificity. Impaired consciousness carried an odds ratio of 2.6, capillary refill over 2 seconds 4.1, a slow heart 8.8, and any two features 9.6. Lethargy alone discriminated poorly (Maitland et al 2006).
- Across 77 studies of about 198,000 children with lower respiratory infection, very severe pneumonia (pneumonia plus a danger sign) carried a pooled odds ratio for death of 9.42 (6.37 to 13.92). Severe malnutrition carried 4.27, age under two months 5.22 and HIV 4.68 (Sonego et al 2015).
- Low oxygen carried a pooled odds ratio for death of 5.47 (3.93 to 7.63) (Lazzerini et al 2015, search summary). Gambian children below 90 per cent saturation died at 12.7 per cent against 2.6 (Usen et al 1999, in THRIVING library, IN-03).

The young infant's seven signs are in MA-05.

Tradition, record, inference. Every lay tradition reads the look of the child first. The record shows the danger signs carry odds of death of roughly 5 to 10, and as a set catch about half of early deaths with a false alarm in about one

child in six. Science infers that they measure failing organs (a brain short of oxygen, sugar or blood flow) rather than any one disease. They say this child is in the group that dies without help, not what the help is. Grade B. The weakest link is the examiner: lethargy is the sign most often missed (Gilroy et al 2013) and the weakest alone (Maitland et al 2006).

4. Pneumonia: count, look, treat at the door

Counting. Fast breathing is 50 or more a minute from two to twelve months and 40 or more from twelve months to five years (WHO 2014). IN-03 holds the accuracy data and method. The rule that matters most: a full minute by a clock in a calm child, not crying or feeding, and count again if within five of the line.

Indrawing and the other signs. Lower chest indrawing once sent every child to hospital. The 2014 IMCI revision moved indrawing without a danger sign into the yellow row, treated at home with oral amoxicillin for five days. The pink row now holds any danger sign or stridor in a calm child: first dose and refer (WHO 2014). IN-03 gives the accuracy of cyanosis, grunting, flaring and head nodding for low oxygen. Four trials drove the change.

Trial	Where, who	Arms	Treatment failure	Deaths
APPIS (Addo-Yobo et al 2004)	8 countries, about 1,700 children aged 3 to 59 months, severe pneumonia, in hospital	Oral amoxicillin against injected penicillin	19 per cent in both arms at 48 hours, risk difference minus 0.4 (minus 4.2 to 3.3)	No difference
NO-SHOTS (Hazir et al 2008)	7 sites in Pakistan, 2,037 children with indrawing	Amoxicillin 80 to 90 mg/kg a day at home for 5 days against 48 hours of injected ampicillin in hospital	7.5 against 8.6 per cent by day 6	1 at home, 4 in hospital
Haripur (Bari et al 2011)	28 clusters in Pakistan, Lady Health Workers	Amoxicillin by the worker against first dose and referral	9 against 18 per cent	Not read
EMPIC (EMPIC Study Group 2022)	Bangladesh, Ethiopia, India, Malawi, 4,013 children with indrawing and saturation of 90 or more	Community worker with oximeter and amoxicillin 50 mg/kg twice daily for 5 days against referral	4.3 against 4.4 per cent at day 14	5 in each arm

APPIS, NO-SHOTS and Haripur were read through summaries, EMPIC in full. Four times, in different hands, a child with indrawing who can drink, has no danger sign and is not short of oxygen did as well on tablets at home as on injections in hospital. Grade A.

Two caveats. EMPIC screened out low oxygen with a pulse oximeter, which community workers used correctly 91 per cent of the time. Without one, the village treats at home some children the trials would have sent to oxygen. And NO-SHOTS ran from tertiary hospitals with a hospital behind the home arm.

What community treatment does to deaths. Sazawal and Black (2003) pooled nine community trials, none individually randomised: total mortality fell 24 per cent at 0 to 4 years and pneumonia mortality 36 per cent (press release

and abstract). At Gadchiroli, India, village workers trained by the Bangs counted breaths and gave co-trimoxazole. From 1988 to 1991, 2,568 treated attacks had a case fatality of 0.9 per cent against 13.5 in the control area (Bang et al 1990, with the 1994 follow-up, search summaries). That is roughly one death prevented for every eight children treated [VERIFY: my arithmetic, and the control area had some care]. Theodoratou and colleagues pooled a 35 per cent fall in pneumonia deaths (18 to 48) and gave treated case fatality as 0.6 per cent for severe and 6.5 for very severe pneumonia (Theodoratou et al 2010, in THRIVING library, IN-01).

Case fatality by severity. A guide, not a table to calculate from, since the figures come from different places and decades.

Class	Untreated	Treated with oral antibiotic	Source
Fast breathing only	About 5 per cent fail on placebo, deaths very rare	2.6 per cent fail	Jehan et al 2020, in IN-03
Indrawing, no danger sign	No modern untreated series. 13.5 per cent of all pneumonia in an untreated Indian community	0.2 to 0.9 per cent die	Bang et al 1990, Hazir et al 2008, EMPIC 2022
Very severe	Odds of death about 9 times the lesser classes	6.5 per cent die even in hospital	Sonego et al 2015, Theodoratou 2010 in IN-01

The dose. IN-03 has the dosing debate. Amoxicillin 40 mg/kg twice a day (tolerance 35 to 50) as 250 mg tablets: one twice a day at 4 to under 10 kg, two at 10 to under 14 kg, three at 14 to 19 kg. Five days for indrawing, three for fast breathing alone. Review at 48 hours if possible, at three days at the latest (WHO 2014, THRIVING library, IN-03).

When stock is short. The RETAPP trial found a number needed to treat of 44 for fast breathing alone (THRIVING library, IN-03). A village whose amoxicillin will not last should keep it for indrawing, children under twelve months and fast breathing with fever, and watch the rest. [OWNER] This is rationing, not clinical advice, and the owner decides whether the book teaches it. IN-05 estimates about 160 small tablets per life saved [VERIFY].

5. Diarrhoea: fluid, zinc and food

Assessment and plans. HY-03 holds the four-sign grading, the Plans A, B and C, the vomiting rule and the household recipe. IMCI adds two classes. Diarrhoea for 14 days or more is persistent: with dehydration, treat it and refer. Without it, give extra feeds, replace half the animal milk with yoghurt or thick food, give zinc for 14 days and review at 5 days. Blood in the stool is dysentery: ciprofloxacin 15 mg/kg twice a day for 3 days, review at 3 days (WHO 2014). IN-11 holds the dysentery drugs and the drugs that fail.

What ORS does to deaths. Munos, Fischer Walker and Black (2010) reviewed 205 papers and estimated that ORS may prevent 93 per cent of diarrhoea deaths, a modelled figure. Evidence was too thin to estimate the effect of recommended home fluids (search summary). Grade A for ORS, C for home fluids without salt.

Zinc, old and new. HY-03 gives the Cochrane review (Lazzerini and Wanzira 2016): about 11 hours shorter diarrhoea over six months of age, 26 hours in malnourished children, no benefit under six months, more vomiting. The standard dose is 20 mg a day from six months and 10 mg under six months, for 10 to 14 days (WHO 2014).

The newer trial changes the stock arithmetic. Dhingra and colleagues (2020) randomised 4,500 children aged 6 to 59 months in India and Tanzania to 5, 10 or 20 mg of zinc daily for 14 days. Diarrhoea lasting over five days occurred

in 7.2, 7.7 and 6.5 per cent, and both lower doses met the non-inferiority margin. Vomiting within 30 minutes of a dose fell from 19.3 per cent on 20 mg to 15.6 on 10 mg and 13.7 on 5 mg. One large blinded trial, not yet replicated. Grade A, one trial.

Inference. A quartered 20 mg tablet gives 5 mg, so a store for 100 episodes treats about 400 [VERIFY: the trial used exact doses, and no study tested split tablets]. WHO has not changed its dose. [OWNER] Whether the book teaches 20 mg or the trial's lower doses once stock is scarce is the owner's decision. My recommendation: the standard while stock is plentiful, half a tablet (10 mg) from six months once the store falls below a year's need.

Feeding. Many traditions rest the gut. The record says the opposite. Brown, Peerson and Fontaine (1994) pooled 29 trials in 2,215 children: most young children with acute diarrhoea can take undiluted animal milk, and dilution and lactose-free formulas are unnecessary when ORS is given (search summary). A Cochrane review of 12 trials with 1,283 children found that early refeeding did not lengthen diarrhoea or increase vomiting (Gregorio et al 2011, search summary). IMCI: breastfeed more often and longer, more fluids (soup, rice water, yoghurt drinks, clean water), continue normal food (WHO 2014). Hesperian adds gruels of rice, maize or potato and a little food every hour or two when stools are many (Hesperian n.d.). After the illness, one extra meal a day for two weeks [VERIFY: source not reread]. Grade A.

Fluid restriction is common now. Perin and colleagues (2015) analysed surveys from six African countries in 2010 and 2011. The share of children with diarrhoea given less to drink than usual, or nothing, was 55 per cent in Nigeria, 49 in Ethiopia, 44 in Uganda, 37 in Tanzania, 36 in the Democratic Republic of the Congo and 32 in Burkina Faso. Children whose fluids were cut were 3.51 times as likely (2.66 to 4.64) to have food withheld. Rural, poorer and less-schooled households cut most, and breastfed children were cut slightly more often, which suggests some mothers stop the breast. Deaths and reasons were not measured. Because it is the commonest, this is the most important harmful practice in the report.

6. Malnutrition: the tape, the feet and the spoon

Measuring. From six months, a mid-upper-arm circumference (MUAC) under 115 mm, or pitting oedema of both feet, is severe acute malnutrition (SAM). MUAC 115 to under 125 mm is moderate (WHO 2014). MUAC under 115 mm alone carries about four times the hazard of death of a child with no deficit, and with a low weight-for-height as well about eight times (pooled cohorts, search summary). HY-09 and FO-07 hold the method.

Mothers can measure. In Mirriah, Niger, 103 briefly trained mothers classified their own children with a colour-banded strap (red under 115, yellow 115 to 125, green above) against community health workers. Sensitivity for SAM was 73 to 80 per cent and specificity 97 to 99. For any acute malnutrition sensitivity was 95 to 98 and specificity 81 to 83, weighted kappa 0.74 to 0.77, with no child moved from red to green or back (Blackwell et al 2015). A larger follow-up found mothers non-inferior to health workers (Alé et al 2016, search summary). Grade B. Every household with a child can own a marked strip of cloth.

The appetite test. The child passes by eating at least a third of a 92 g packet of therapeutic food within 30 minutes (WHO 2014). A child who passes with no complication or danger sign is treated at home with five days of oral antibiotic and therapeutic food, and seen in seven days. A child who fails, or has oedema with a complication, or any danger sign, has complicated SAM: first antibiotic dose, treat low sugar, keep warm, refer (WHO 2014). Loss of appetite usually means infection (THRIVING library, HY-09).

What kills in the first 48 hours. HY-09 gives WHO's timing rule: first-day deaths point to low sugar, cold, sepsis, anaemia or the wrong fluid, and deaths by the third day to feeds too large. Kilifi supplies numbers. Of 920 children with SAM, 176 (19 per cent) died, a third within 48 hours and 41 per cent within 72. Bacteraemia in 12 per cent raised mortality from 17 to 36 per cent, often despite antibiotics the organisms were sensitive to. Children with signs of dehydration but no diarrhoea and a slow capillary refill died at 50 per cent. Hypoglycaemia raised the likelihood of early death fourfold. Hypothermia was rare (Maitland et al 2006).

Hypoglycaemia. Of 3,742 children admitted at Kilifi, 7.3 per cent had low blood sugar and died at 20.2 per cent against 3.8. Malnutrition, severe illness and over 12 hours since the last meal were the risk factors (Osier et al 2003, search summary). Without a glucose meter, treat on suspicion. IMCI: breastfeed if the child can. If the child can swallow, give 30 to 50 ml of milk or sugar water (4 level teaspoons, 20 g, of sugar in 200 ml of clean water). If not, 50 ml by nasogastric tube, or without a tube, 1 teaspoon of sugar moistened with 1 or 2 drops of water under the tongue, repeated every 20 minutes (WHO 2014).

The sublingual route has a small trial behind it. In Mali, 23 children with presumed severe malaria and low blood sugar were randomised to intravenous glucose or about 2.5 g of moistened sugar under the tongue (3.5 g above 15 kg) every 20 minutes, in the recovery position. Seventy-one per cent on sugar and 67 per cent on the drip were normal within 40 minutes, and sugar began in under 5 minutes against 19 for the drip. At least 29 per cent swallowed the sugar, and those made up the failures. Three of ten responders relapsed (Graz et al 2008). An earlier study in Burkina Faso found no failures sublingually against 53 per cent with swallowed sugar (Barennes et al 2005, search summary). Grade B, small but consistent. It needs only sugar and a spoon.

Hypothermia. WHO treats a cold malnourished child as also hypoglycaemic and infected. Rewarm with clothing including the head, under a warmed blanket with a heat source not aimed at the child, or skin to skin on the mother's chest (WHO n.d.). HY-09 gives the 35.0 °C threshold under the arm. On the Kenyan coast hypothermia appeared in 12 of 15,191 readings, and 4 of the 12 children died (Talbert et al 2009, abstract). Inference: in a temperate, unheated post-Fall village it will be commoner, and night feeds and skin-to-skin warmth matter more [VERIFY: inference from climate].

Fluids. The wasted heart fails under normal rehydration volumes. Use ReSoMal slowly as HY-03 and HY-09 give it. FEAST adds a wider warning: 3,141 critically ill African children with poor circulation were randomised to fluid boluses or none, and 48-hour mortality was 10.6 per cent with albumin, 10.5 with saline and 7.3 without, a relative risk of 1.45 (Maitland et al 2011, secondary summary). FEAST excluded SAM and gastroenteritis, but it says that pouring fluid into a feverish child in shock can kill.

Antibiotics for uncomplicated SAM. In Malawi, 2,767 children on therapeutic food were randomised to amoxicillin, cefdinir or placebo. Recovery was 88.7, 90.9 and 85.1 per cent, mortality 4.8, 4.1 and 7.4, a relative risk of death of 1.55 on placebo against amoxicillin (Trehan et al 2013, search summary). That is about one death prevented per 38 children treated [VERIFY: my arithmetic]. In Niger, 2,399 children recovered at 65.9 per cent on amoxicillin and 62.7 on placebo, not significantly different, though amoxicillin cut transfers to inpatient care from 30.7 to 26.4 per cent (Isanaka et al 2016, abstract). The benefit appeared where HIV and sepsis were common. IMCI keeps the course (WHO 2014). Grade A, contested. [OWNER] Whether the village gives every child with SAM an antibiotic course when stock is short is the owner's decision. My recommendation is yes while stock lasts.

Therapeutic food from the village. HY-09 holds the Manary recipe and production rules. An ENN Field Exchange account of the Malawi programme gives the same proportions by weight: milk powder 30 per cent, sugar 28 (powdered if mixing by hand), salt-free peanut paste 25, oil 15, vitamin and mineral mix 1.6, at 175 kcal per kg a day, with no water at all (ENN 2004). Both describe the same team's work, so they are not independent sources. An independent Indian recipe agrees closely: peanut 26, sugar 27, milk solids 25, oil 20 per cent with a mineral mix, tested for aflatoxin every three months (Bhandari et al 2016).

What it achieved:

- **Malawi.** In 282 HIV-negative children over one year, 95 per cent on full home therapeutic food reached a weight-for-height above the median against 78 per cent on a supplement or maize and soy flour, gaining 5.2 against 3.1 g/kg a day (Manary et al 2004, abstract). Locally made paste gave 80 per cent recovery and 9 per cent relapse (ENN 2004). Twenty-one community programmes treated 23,511 children with 79.4 per cent recovery and 4.1 per cent mortality, three quarters wholly at home (Collins et al 2006, search summary).

- **India.** In 906 children, recovery by 16 weeks was 56.9 per cent on locally made paste, 47.5 on factory food and 42.8 on augmented home food (cereals, pulses, oil, milk and eggs supplied in excess, with micronutrient powder). Deaths were 1, 2 and 0 (Bhandari et al 2016).
- **Without milk.** A soy, maize and sorghum paste was non-inferior in Malawi, and in the Democratic Republic of the Congo non-inferior under 24 months but inferior above (Bahwere et al 2016 and 2017, search summaries). Cochrane found no formulation clearly better (Schoonees et al 2019, search summary).

Aflatoxin. Peanuts and maize stored damp grow *Aspergillus flavus*, whose aflatoxin damages the liver. Maize stored wet in eastern Kenya in 2004 caused 317 cases of acute aflatoxicosis and 125 deaths by July (CDC 2004, search summary). Haitian market peanuts tested at 1,500 parts per billion, and in Harare 60 per cent of raw peanuts and every informal peanut butter sample were contaminated (search summaries only, primary sources not recorded [VERIFY]). Quoted limits range from 5 to 20 parts per billion. Malawi producers tested every batch (ENN 2004). The village cannot test. It can sort by hand and discard every black, shrivelled, mouldy or bitter nut, dry fast in sun and store dry and off the ground [VERIFY: no trial of sorting read]. [OWNER] Whether the village makes peanut paste without any aflatoxin test, or uses milk-and-cereal food instead, is the owner's decision.

Allergy. No source found reports allergy as a significant problem in therapeutic food programmes, but none looked hard. A child who swells, wheezes or breaks out in hives after the paste stops it at once and moves to a milk or cereal food [VERIFY: no primary source].

7. Fever, the febrile seizure, malaria and measles

Cross-referenced only. Fever with a stiff neck or a danger sign is very severe febrile disease: first antibiotic dose, antimalarial where malaria occurs, refer (WHO 2014). Febrile seizures and why paracetamol does not prevent them are in IN-02. Aspirin is never given to a child because of Reye's syndrome, which killed 31 per cent of 1,207 American cases (THRIVING library, IN-02). Malaria is in IN-09, measles and vitamin A in IN-12. For cough, honey at bedtime helped a little more than nothing in six trials of 899 children aged one year and over (Oduwole et al 2018, search summary), and is never given under twelve months because of infant botulism (THRIVING library, MA-06).

8. Tradition on its own terms, and the harmful treatments

How the traditions see it. Childhood diarrhoea is often understood as several illnesses divided by cause. In Swaziland in the early 1980s, Edward Green, working with healers, recorded three main kinds. The two serious kinds were held to have unnatural causes and were treated by healers with enemas, and children came to the clinic after these had failed, often badly dehydrated (Green 1985, abstract). Among Mexican, Guatemalan and Texan Latino families, caída de la mollera (fallen fontanelle) is the soft spot dropped after a fall or a nipple pulled too sharply from the mouth. The folk cure restores it by holding the baby upside down and pushing the palate up with a thumb. Its signs (sunken soft spot, diarrhoea, vomiting, poor feeding) are the signs of dehydration, and rehydration was not widely seen as its treatment (Pachter et al, search summary). In Uganda and much of eastern Africa, swellings over the erupting canines are held to be "false teeth" (ebiino) causing fever, diarrhoea and cough, and the healer gouges out the tooth buds (Tungotyo 2017). In Ethiopia and the Sahel the uvula is cut against throat and chest illness (THRIVING library, PH-06, TR-07).

Each tradition sees a visible change and acts on it. The action is local and mechanical, the danger systemic and silent: water loss, infection, hunger. None of these practices is restricted or secret in the sources read.

The record.

Practice	Purpose in the tradition	What the record shows	Grade
Cutting fluids in diarrhoea	Rest the bowel	32 to 55 per cent of children in six countries, with food also withheld (Perin et al 2015). Deaths not measured, mechanism direct	X
Starving the child	Starve the illness	Early feeding does not worsen diarrhoea (Gregorio et al 2011)	X
Purges, laxatives, enemas	Clear the cause	"Never give a laxative to someone with diarrhea" (Hesperian n.d.). Late, dehydrated arrival in Swaziland (Green 1985)	X
Opium, loperamide	Stop the flow	Fatal ileus in children, serious harms all under 3 (IN-11)	X
Ebiino (tooth-bud extraction)	Remove the cause	Bleeding, sepsis, tetanus, noma. 14.5 per cent of infants admitted with complications of such practices died in a northern Ugandan study. Prevalence 15 to 80 per cent (Tungotyo 2017)	X
Uvulectomy	Prevent chest illness	Complications in 29 per cent, shared blades (PH-06, TR-07)	X
Fontanelle lifting	Restore the soft spot	The harm is delayed rehydration (Pachter et al)	D, X if it replaces fluid
Cautery and scarification	Draw out the illness	No outcome data found in children [VERIFY]. An open burn in a sick child	X by inference
Rice water, soups, yoghurt, more breastfeeding	Feed and give drink	What IMCI recommends (WHO 2014)	A
Carrying skin to skin	Comfort, warmth	WHO's rewarming method (WHO n.d.)	B

Inference. The book should not tell families their categories are wrong. It should say that every kind of diarrhoea, whatever its cause, drains water and salt, so drink and food go on while any other treatment is given. Green concluded the way forward was through the healers, not against them (Green 1985). [OWNER] Whether the village asks healers to give ORS alongside their remedies, or discourages the remedies outright, is the owner's decision. The practices graded X should be refused either way.

Evidence grades

Practice	What it does	Grade
IMCI general danger signs	Odds of death 5 to 10, catch about half of early SAM deaths	B
IMCI as a package	Mortality RR 0.85, null in the one large trial	A, low certainty
Breath count and indrawing	Sensitive, not specific, rough in lay hands	B
Community antibiotic for pneumonia	Pneumonia deaths down about a third, all deaths about a quarter	B
Oral amoxicillin at home for indrawing	Equal to injection in hospital in four trials	A
Amoxicillin for fast breathing alone	NNT 44	A
ORS	Up to 93 per cent of diarrhoea deaths prevented (modelled)	A
Zinc 20 mg (10 under 6 months)	About 11 hours shorter, more vomiting	A, low certainty
Zinc 5 or 10 mg	Non-inferior, less vomiting	A, one trial
Continued feeding, undiluted milk	No worse diarrhoea	A
MUAC and oedema, by mothers	Predict death, mothers can measure	B
Sugar water, sublingual sugar	Raises sugar as fast as a drip	B
Skin-to-skin rewarming	Recommended, untested in SAM	C
Antibiotic in uncomplicated SAM	Deaths down in Malawi, recovery unchanged in Niger	A, contested
Home therapeutic food, factory or village	80 to 95 per cent recovery	A
Augmented home food	43 against 57 per cent recovery	A
Fluid boluses in febrile shock	Deaths up 45 per cent	X
Fluid or food withholding, purges, enemas, opiates, ebiino, uvulectomy, aspirin, honey under 1	Harm	X

Means ledger

Rung	Danger signs	Pneumonia	Diarrhoea	Malnutrition
Hands	Four questions, look for lethargy, indrawing, stridor, blue lips	Count, sit upright, keep breastfeeding	Breastfeed more, any clean fluid, keep feeding	Cloth strip marked at 115 and 125 mm, press both feet, offer food
Hearth	Clock or sand glass, chart, sugar water, skin-to-skin warmth	No drug	Salt-sugar or cereal ORS (HY-03), rice water, yoghurt	Thick porridge with oil and sugar, eggs, milk, five meals and a night feed (HY-09)

Rung	Danger signs	Pneumonia	Diarrhoea	Malnutrition
Garden and still	Scale, register	As above	Sprouted-grain flour to thin gruel (HY-09)	Peanut, milk, sugar and oil paste from sorted nuts. Without the mineral mix it is food, not therapy
Village dispensary	Lay healer with printed chart, MUAC tapes, timer	Amoxicillin by weight band, co-trimoxazole second line	ORS packets, zinc, ciprofloxacin	Antibiotic, vitamin A, therapeutic food, ReSoMal, nasogastric tube
District infirmary	Nurse, glucose meter and oximeter if salvaged	Injected ampicillin and gentamicin, oxygen if any	Drip for shock	F-75 and F-100 ward with night staff, transfusion
Pre-Fall hospital	Laboratory, X-ray	Oxygen, intensive care	Electrolytes	Full WHO ten steps

Hands alone change little in pneumonia, a great deal in diarrhoea and something in malnutrition through early detection. The hearth adds the fluid that prevents most diarrhoea deaths and the sugar that prevents hypoglycaemic deaths. The dispensary's amoxicillin moves pneumonia case fatality from about 13.5 per cent towards 1 (Bang et al 1990), and its antibiotic and food move SAM from hospital mortality near 19 per cent to about 4 (Maitland et al 2006, Collins et al 2006), though those were different children. The district adds oxygen and safe fluids for the few in shock or hypoxaemia.

Harm test

Remedy	How it harms	Who must not	Signs going wrong	What to do	Source
Amoxicillin	Rash, rarely anaphylaxis, diarrhoea. Under-dosing fails	Known penicillin allergy	Hives, swollen face, wheeze. Worse at 48 hours	Stop. Co-trimoxazole instead. Check dose and stock	IN-03, IN-05
Ciprofloxacin	Joint concerns (theoretical in short courses), resistance	No absolute bar in a 3-day course [VERIFY]	No better at 48 hours	Change drug, think of amoebae	IN-11
ORS	Too salty causes fits. Too fast in SAM causes heart failure	Malnourished child at Plan B rates	Puffy eyelids, fast breathing, convulsion	Stop, give breast milk or water	HY-03
Zinc	Vomiting in one child in five at 20 mg	Under 2 months not studied	Vomits within 30 minutes	Repeat. Lower the dose	Dhingra 2020

Remedy	How it harms	Who must not	Signs going wrong	What to do	Source
Sugar under the tongue	Aspiration if fitting or face up. Fails if swallowed	Clenched jaw	No waking at 20 minutes	Repeat, recovery position, tube	Graz 2008
Home paste	Aflatoxin, bacteria in a paste with no kill step, allergy, sharing	Fails appetite test, known peanut allergy	Jaundice, vomiting, hives, no weight gain at 2 weeks	Stop the batch, discard its nuts, refer	CDC 2004, HY-09
Fast refeeding in SAM	Heart failure, refeeding syndrome	Oedema or severe wasting in the first week	Breathing up by 5, pulse up by 25	Halve feeds	HY-09
Fluid bolus in febrile shock	More deaths	Fever and poor circulation without blood loss or gastroenteritis	Breathlessness, crackles	Stop, sit up	Maitland 2011

Red flags

These mean death or disability without oxygen, a drip, blood, intensive nursing or a laboratory.

- **Stridor at rest** in a calm child: the airway is narrowing (croup, diphtheria, a foreign body, IN-12).
- **Central cyanosis**, a blue tongue and lips: oxygen is low and only oxygen helps.
- **Grunting, head nodding, severe indrawing** with a rate of 70 or more: the child is tiring.
- **Cannot drink or breastfeed, vomits everything**: the gut route is closed.
- **Convulsions, coma, unrousable lethargy.**
- **Shock**: cold hands, weak fast pulse, capillary refill over 3 seconds, drowsy.
- **SAM with any danger sign, or failing the appetite test**: Kilifi lost a third of its deaths in 48 hours despite a hospital.
- **White palms**: severe anaemia needs blood.

What to do anyway: first antibiotic dose, sugar under the tongue, skin-to-skin warmth, breastfeeding or small spoonfuls if the child can swallow, upright for breathing or on the side if drowsy, and send if the journey is possible. If not, stay. Honest comfort: a child held warm by a parent, not forced to drink, not cut or burned, dies with less distress than one handled by many hands. NU-06 holds palliative care. Tell the parents plainly that this is the child the village cannot save, and that their holding is what is left to give.

The case against

IMCI saves fewer lives than its parts. Arifeen and colleagues found no difference in the fall of child mortality in Matlab (Arifeen et al 2009), and Gilroy and colleagues found that the signs carrying the risk were the ones skipped (Gilroy et al 2013). A chart in untrained hands gives false confidence. Supervision answers this, but a book alone will not.

Over-treatment of pneumonia. Jehan and colleagues showed that 43 of 44 children with fast breathing alone recover without amoxicillin, and fast breathing has a specificity of only about 22 per cent against X-ray (Jehan et al 2020, Rees et al 2020, both in IN-03). A village that treats every fast breather runs out before the child with indrawing.

The trials do not travel. APPIS and NO-SHOTS ran from tertiary hospitals, NO-SHOTS excluded high-HIV settings, and EMPIC screened out low oxygen with an oximeter the village lacks.

Home food nearly matches the factory. Only 14 percentage points separated village paste from well-supplied home food (Bhandari et al 2016), and Manary warns that hand-mixed paste is too inconsistent to rely on (Manary 2006, in HY-09). Without the premix, the village paste is close to home food.

The SAM antibiotic is contested. Trehan's mortality benefit and Isanaka's null recovery result came from different populations (Trehan et al 2013, Isanaka et al 2016). Routine use drains stock and breeds resistance.

WHO's own fluid rules were wrong. FEAST showed a decades-old emergency standard raised deaths (Maitland et al 2011). Rules carried over from rich-world wards deserve humility.

The romance of the hospital and of the herbal. Even in hospital, 19 per cent of malnourished children at Kilifi died (Maitland et al 2006). And no plant in the sources read replaces amoxicillin, zinc or therapeutic food (THRIVING library, IN-01). The useful traditional treatments are foods and fluids.

10-line summary

1. Before modern medicine about a third of children died before five and nearly half before fifteen, and the records undercount.
2. The four danger signs (cannot drink, vomits everything, convulsions, lethargy) carry odds of death of 5 to 10, and lay workers most often skip them.
3. Count breaths a full minute in a calm child: 50 or more under 12 months, 40 or more from 1 to 5 years.
4. A child with indrawing and no danger sign does as well on amoxicillin at home as on injections in hospital, in four trials.
5. Community pneumonia treatment cuts pneumonia deaths by about a third and all child deaths by about a quarter.
6. ORS prevents most diarrhoea deaths. Feed through diarrhoea and never cut fluids, which half of mothers in some countries still do.
7. Zinc at 5 or 10 mg works as well as 20 mg with less vomiting, so a tablet goes two to four times further.
8. MUAC under 115 mm or oedema of both feet is severe malnutrition, and mothers can measure it with a marked strap.
9. A third of malnourished children's hospital deaths come within 48 hours: sugar, warmth, antibiotics and slow feeds prevent them.
10. Village peanut-milk paste matched factory food in India, but the nuts must be sorted against aflatoxin.

Open questions

- The sensitivity of each danger sign for death at 2 to 59 months was not found.
- How many children with indrawing are hypoxaemic and will die at home without an oximeter? EMPIC excluded them.
- Do split zinc tablets deliver the trial dose?
- Does hand sorting bring peanut aflatoxin below a safe limit?
- Can a village paste without the imported mineral mix match therapeutic food? HY-09 says not.
- What is untreated case fatality by severity in a modern community? Gadchiroli's 13.5 per cent is the only figure.
- How common will hypothermia be in malnourished children in a temperate, unheated village?
- Does sublingual sugar work in the hypoglycaemia of malnutrition? Only malaria was studied.

Sources to read in full

1. WHO 2014, the IMCI chart booklet, from the WHO file rather than the copy I read.
2. Gilroy et al 2013, what lay workers actually do with a chart.
3. Maitland et al 2006, what kills malnourished children and when.
4. Hazir et al 2008 and EMPIC Study Group 2022, home amoxicillin for indrawing.
5. Bhandari et al 2016, village paste against home food.
6. Perin et al 2015, fluid curtailment.
7. Dhingra et al 2020, lower-dose zinc.
8. Graz et al 2008 and Barennes et al 2005, sublingual sugar.
9. Blackwell et al 2015, mothers measuring MUAC.
10. Green 1985, working with healers on childhood diarrhoea.

At the bedside after the Fall

Household. Needs: a cloth strip marked at 115 and 125 mm, a one-minute timer, the litre vessel and scoops of HY-03, sugar, cup and spoon. Skills: the four questions, the breath count, the skin pinch, the foot press, the recipe, feeding through illness, sugar under the tongue. Record: a card with monthly weight and MUAC. First failure to expect: cutting fluids or food when diarrhoea starts, and waiting for the healer while the child dries out.

Village of 300 (about 45 children under five). Needs: a trained lay healer and a deputy, the printed chart, MUAC tapes, a scale, a register. Stock: amoxicillin 250 mg tablets (about 13 pneumonia episodes a year at IN-01's estimate, 10 to 30 tablets each), zinc, ORS packets, ciprofloxacin, co-trimoxazole, vitamin A. Food: sorted dry peanuts (*Arachis hypogaea*), milk powder or a milking animal, oil, sugar, rice (*Oryza sativa*), mung beans (*Vigna radiata*), a mineral mix if any can be salvaged. First failure to expect: the healer skips the physical signs, treats every cough with amoxicillin, and the stock is gone by the second winter.

District of 3,000 (about 450 children under five). Needs: a nurse or doctor, a ward that feeds every two hours day and night, a glucose meter and oximeter if salvaged, oxygen if any, injectable ampicillin and gentamicin, nasogastric tubes, ReSoMal, the F-75 and F-100 recipes of HY-09, a paste bench with a mixer. First failure to expect: night deaths from cold and missed feeds, and deaths at 48 to 72 hours from feeds too large.

Protocols

Protocol 1. The sick-child decision chart (2 months to 5 years)

Work top to bottom. Stop at the first pink box.

Step	Ask, look, count	Class	Do
1. Danger signs	Cannot drink or breastfeed? Vomits everything? Convulsions? Lethargic or unconscious?	Any: PINK, very severe	Sugar (Protocol 4), first amoxicillin dose, skin-to-skin warmth, send now. Fitting: on the side, nothing in the mouth but sugar under the tongue
2. Breathing	Cough or hard breathing? Count 60 seconds, calm. Stridor at rest? Blue tongue?	Stridor or blue tongue: PINK	First dose, upright, send

Step	Ask, look, count	Class	Do
	Indrawing, or rate 50 or more under 12 months, 40 or more at 1 to 5 years	YELLOW, pneumonia	Amoxicillin 5 days for indrawing, 3 for fast breathing (Protocol 2). Review day 2 or 3
	Neither	GREEN, cough or cold	Feed, fluids, honey only over 1 year, return if fast breathing
3. Diarrhoea	Two of: lethargic, sunken eyes, drinks poorly or not at all, pinch goes back very slowly	PINK, severe dehydration	HY-03 Plan C or tube. Send if a drip is within 30 minutes
	Two of: restless, sunken eyes, drinks eagerly, pinch goes back slowly	YELLOW, some	Plan B, 75 ml/kg in 4 hours (HY-03), zinc
	Blood in stool	YELLOW, dysentery	Ciprofloxacin 15 mg/kg twice daily 3 days (IN-11), zinc, fluids, food. Review day 3
	14 days or more	YELLOW, or PINK if dehydrated	Extra meals, yoghurt for half the milk, zinc 14 days, review day 5
	None	GREEN	Plan A, zinc, keep feeding
4. Fever	Stiff neck or any danger sign	PINK	First antibiotic dose, antimalarial where malaria occurs, send (IN-02, IN-09)
5. Nutrition	Oedema of both feet or MUAC under 115 mm, and fails appetite test, or a pink sign	PINK, complicated SAM	Sugar, warmth, first dose, send to the F-75 ward (HY-09)
	Same, passes appetite test, no complication	YELLOW, SAM	Amoxicillin 5 days, therapeutic food at home, review day 7 (Protocol 5)
	MUAC 115 to under 125 mm	YELLOW, moderate	Extra meals, review in 30 days
6. Every child	Breastfeeding? Eating?		Breastfeed more often, continue food. Return at once if cannot drink, sicker, fever, fast breathing, blood in stool

Write date, weight, MUAC, breath count, class and treatment in the register for every child.

Protocol 2. Pneumonia at the door

- ☐ Calm the child on a parent's lap, bare the chest, count one full minute by a clock. Within 5 of the line: count again after 10 minutes.
- ☐ Look for indrawing, stridor, grunting, head nodding, blue tongue.
- ☐ Weigh. Amoxicillin 250 mg: 4 to under 10 kg one tablet twice a day, 10 to under 14 kg two, 14 to 19 kg three (WHO 2014). Tolerance 35 to 50 mg/kg a dose.
- ☐ Indrawing 5 days, fast breathing alone 3 days.
- ☐ Give the first dose in front of you, dissolved in breast milk or water. Show the parent the second.
- ☐ Keep breastfeeding, small frequent drinks, sit upright.
- ☐ Review at 2 to 3 days. Better: finish. Same: check doses were given, think of malaria and wheeze. Worse or a danger sign: send.
- ☐ Stock short (the owner's rule in section 4): keep amoxicillin for indrawing, under 12 months, and fast breathing with fever.

Protocol 3. Diarrhoea at home (with HY-03)

- ☐ Grade dehydration by the four signs (HY-03).
- ☐ Plan A after each loose stool: under 2 years 50 to 100 ml, 2 years and over 100 to 200 ml (WHO 2014).
- ☐ Never cut drinks, never stop the breast, never give purges, enemas, laxatives, opium or loperamide.
- ☐ Zinc 10 to 14 days: 2 to 6 months half a 20 mg tablet, from 6 months one tablet (WHO 2014). Stock short (the owner's rule in section 5): half a tablet from 6 months, a quarter as the lowest tested dose (Dhingra et al 2020).
- ☐ Dissolve zinc in a spoon of breast milk, water or ORS. Vomited within 30 minutes: give again.
- ☐ Feed: breast more often, porridge, rice, soups, mashed banana, yoghurt, eggs, a little every hour or two if stools are many.
- ☐ Blood in stool: ciprofloxacin 15 mg/kg twice daily for 3 days, about one 250 mg tablet twice daily from 6 months (WHO 2014).
- ☐ After recovery, one extra meal a day for two weeks [VERIFY].

Protocol 4. Low blood sugar, by hand

Give to every child with a danger sign, every child with SAM on arrival, and every sick child who has not eaten for 12 hours.

- ☐ Can breastfeed: breastfeed now.
- ☐ Can swallow: 30 to 50 ml of milk or sugar water (4 level teaspoons, 20 g, of sugar in 200 ml of clean water) (WHO 2014).
- ☐ Cannot swallow, no tube: lay the child on the side. Moisten 1 teaspoon of sugar (about 2.5 g, 3.5 g above 15 kg) with 1 or 2 drops of water and put it under the tongue (WHO 2014, Graz et al 2008).
- ☐ Repeat every 20 minutes, and at once if swallowed.
- ☐ Expect waking within 20 to 40 minutes. Continue until the child can drink, then feed.
- ☐ Never pour liquid into a mouth that cannot swallow.

Protocol 5. Severe malnutrition at home (passes appetite test, no complication)

- ☐ MUAC on the left arm halfway between shoulder and elbow, tape snug, not tight. Press both feet for 3 seconds (HY-09).
- ☐ Appetite test: about 30 g (a third of a 92 g packet) of paste with water to drink. Pass: eaten within 30 minutes (WHO 2014).
- ☐ Amoxicillin 5 days at the pneumonia dose while stock allows (the owner's rule in section 6).

- ☐ Vitamin A by age (HY-09, IN-12).
- ☐ Paste at about 175 kcal/kg a day (ENN 2004): about 32 g/kg a day, roughly 230 g for a 7 kg child [VERIFY: my arithmetic at about 5.4 kcal per gram]. Plan for 6 to 8 weeks.
- ☐ Without paste: five or more meals a day of the HY-09 foods, oil in every meal.
- ☐ Breastfeed first, then the paste, with clean water to drink.
- ☐ The paste is the sick child's alone. Sharing with siblings is the commonest failure (HY-09).
- ☐ Night: skin-to-skin warmth and one feed.
- ☐ Review weekly. Falling MUAC, not eating, fever, dehydration, new oedema: send.
- ☐ End at MUAC 125 mm or more without oedema on two visits (HY-09).

Protocol 6. Making and checking the village paste

- ☐ Sort every peanut by hand in daylight. Discard black, shrivelled, mouldy, discoloured or bitter nuts. Dry the rest in the sun and store in sealed jars off the floor.
- ☐ Weigh by HY-09: milk powder 30, sugar 28 (powdered), peanut paste 25, oil 15, mineral and vitamin mix 1.6 parts (ENN 2004, HY-09).
- ☐ No water at all. Oil below 45 °C (HY-09).
- ☐ Wash tools after the day's work, not during it, so no water enters the paste (ENN 2004).
- ☐ Label each jar with date and batch. Use within 3 months (HY-09).
- ☐ Without the mineral mix, call it food, not therapy.
- ☐ A child on a batch who turns yellow, vomits repeatedly or swells: stop the whole batch and discard its nuts.

Numbers to carry

1. **50 and 40.** Fast breathing per minute under 12 months and from 1 to 5 years. Count a full minute.
2. **Four danger signs.** Cannot drink, vomits everything, convulsions, lethargic. Any one: first dose, sugar, warmth, send.
3. **Amoxicillin 1, 2, 3.** Tablets of 250 mg twice a day at 4 to 10, 10 to 14 and 14 to 19 kg. Five days for indrawing, three for fast breathing.
4. **13.5 to under 1.** Per cent of children with pneumonia who died untreated and treated at Gadchiroli.
5. **75 ml/kg in 4 hours** for some dehydration. Never cut fluids.
6. **Zinc 20 mg, 10 under 6 months, 10 to 14 days.** Lower doses work when stock is short.
7. **115 and 125 mm.** MUAC for severe and moderate malnutrition. Oedema of both feet is severe whatever the arm.
8. **20 g sugar in 200 ml.** Give 50 ml. Or a teaspoon of wet sugar under the tongue every 20 minutes.
9. **48 hours.** A third of malnourished children's hospital deaths come in the first two days.
10. **A third of a packet in 30 minutes** passes the appetite test.

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