FO-07 Diagnosis by hand, eye, ear and nose: the physical examination without instruments

HEALING after the FALL, research library, FO-07

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

How to read this document

Every other chapter of HEALING after the FALL begins with recognition. This document gathers what the body tells an examiner who has hands, eyes, ears, a nose, a watch or a pendulum, and perhaps a thermometer, with the accuracy that has been measured, by whom and on whom.

Three warnings run through it.

- **Nearly every number was measured by trained clinicians**, often in hospitals, on patients sicker than those a village healer will see. Lay readers will do worse at first. The IMCI studies are the exception: they tested health workers with nine to eleven days of training, and they are the best guide to what a careful lay healer can reach.
- **A sign has two jobs and is rarely good at both.** High sensitivity catches illness and misses little but raises false alarms. High specificity confirms illness but misses many cases.
- **Accuracy against an X-ray is not the same as usefulness.** Fast breathing is a poor test for pneumonia on an X-ray, yet treating children by that sign cut pneumonia deaths by about a third. The outcome that matters is death and disability.

The likelihood ratio (LR) is used throughout. An LR+ above 5 makes a disease much more likely, above 10 nearly settles it. An LR- below 0.2 makes it much less likely. Values between 0.5 and 2 barely shift anything.

1. Findings by section

1.1 Looking before touching: danger signs of the sick child

Tradition. Every tradition teaches that the look of a patient tells the most. Where There Is No Doctor opens its examination chapter by asking how ill the person looks, how they move, breathe and think, and insists on examining in good light, preferably sunlight, never in a dark room (Werner and others 2020).

Record. The WHO and UNICEF built the Integrated Management of Childhood Illness (IMCI) on this idea and tested it (Gove 1997). For every sick child aged 2 months to 5 years, the 2014 chart booklet asks: can the child drink or breastfeed, does the child vomit everything, has the child had convulsions, is the child convulsing now, is the child lethargic or unconscious. Any one of these general danger signs means very severe disease and urgent referral (WHO 2014).

The draft algorithm was tested in five countries in 1997. Against a paediatrician in 440 Gambian children it detected pneumonia with 81% sensitivity and 89% specificity, dehydration with 67% and 96%, and malnutrition with 89%

and 90% (Weber and others 1997). In Kenya, pneumonia was caught with 97% sensitivity but only 49% specificity (Perkins and others 1997). In Ethiopia, health workers after a nine-day course recognised common signs 67 to 91% of the time but uncommon ones only 20 to 45% (Simoes and others 1997). In Bangladesh the decision to refer was 84 to 86% sensitive and 54 to 64% specific (Kalter and others 1997b). The direction replicates: the algorithm catches most seriously ill children at the price of over-referral.

The danger signs predict death. In northern Tanzania, 466 febrile children were followed and 34 died (7.3%). Inability to drink carried an odds ratio for death of 8.9 (95% CI 4.0 to 19.6), lethargy 5.2, stiff neck 7.0 and capillary refill over 3 seconds 9.0. Laboratory results predicted death less well than the examination (Clifton and others 2012).

Young infants. The Young Infants Clinical Signs Study enrolled 3,177 babies aged 0 to 6 days and 5,712 aged 7 to 59 days in several low-income countries. Seven signs, any one positive, identified severe illness in the first week with 85% sensitivity and 75% specificity, and at 7 to 59 days with 74% and 79%: a history of feeding difficulty, a history of convulsions, movement only when stimulated, respiratory rate 60 or more, severe chest indrawing, temperature 37.5°C or more, temperature below 35.5°C (Young Infants Clinical Signs Study Group 2008). Secondary sources differ on the list of countries [VERIFY]. A 2025 meta-analysis of 52 studies found every IMCI young-infant sign associated with death or sepsis, and named a weak or absent cry, slow capillary refill and central cyanosis as strong predictors missing from the algorithm (JAMA Pediatrics 2025).

Inference. The danger signs measure the end result of many diseases: a brain short of oxygen, glucose or blood flow, or a failing gut. They do not name the disease. They say this child is in the group that dies without help. Grade B.

1.2 Breathing

Thresholds. IMCI defines fast breathing as 60 or more a minute under 2 months, 50 or more from 2 to 11 months, and 40 or more from 12 months to 5 years (WHO 2014). Where There Is No Doctor gives 12 to 20 as normal for adults, up to 30 for young children and 40 for babies, and says 60 in a newborn usually means pneumonia (Werner and others 2020). The book should teach the IMCI figures. They were chosen because a single cut-off performed poorly across ages, while age bands gave sensitivity of about 78 to 82% (WHO Bulletin 2003). Fleming and colleagues pooled 69 studies: the median rate falls from 44 at birth to 26 at two years (Fleming and others 2011).

Effort and noise. Lower chest wall indrawing, seen all the time and not only in crying, marks severe pneumonia. Stridor in a calm child marks severe disease (WHO 2014).

Against the X-ray. Rees and colleagues pooled 15,029 hospital children under five. Age-based fast breathing had sensitivity 0.79 and specificity 0.22 (LR+ 1.01). Indrawing had 0.74 and 0.15. Measured temperature over 38°C had 0.54 and 0.60. Crackles had 0.82 and 0.26. Grunting was rare but specific, 0.06 and 0.96 (LR+ 1.72). No single sign was strongly associated with radiographic pneumonia (Rees and others 2020). These children had already been referred, so nearly all breathed fast, and the X-ray is itself imperfect.

Against death. Sazawal and Black pooled nine community studies in which workers gave antibiotics on these signs. Pneumonia deaths fell by 42% in newborns and 36% in children under five, and deaths from all causes by 27% and 24% (Sazawal and Black 2003). None of the studies was randomised. This is the strongest evidence in the report that a lay healer counting breaths saves lives. Grade B, near A for the outcome.

Can lay workers count? Not easily. In 454 children in four countries, community workers classified breathing as fast or normal with only moderate agreement (kappa 0.41 to 0.49), worst under two months, whatever device they used (Baker and others 2019). Count twice, a full minute each, in a calm child.

Adults. No single chest finding rules pneumonia in. Normal vital signs make it much less likely (LR- 0.18 in one study) (Metlay and others 1997). Where There Is No Doctor treats more than 30 shallow breaths a minute in an adult as usually pneumonia (Werner and others 2020). In infection, the quick sepsis score counts a rate of 22 or more, altered mentation and low systolic pressure [VERIFY cut-offs]. Outside intensive care, two or more points carried a

3 to 14-fold rise in hospital mortality across 148,907 encounters (Seymour and others 2016). A healer without a cuff can still score two of the three.

1.3 The pulse

Rate. Where There Is No Doctor gives resting pulses of 60 to 80 in adults, 80 to 100 in children and 100 to 140 in babies, felt with two or three fingers at the wrist, never the thumb, or in the neck, or by ear on the chest (Werner and others 2020). Fleming's pooled data on 143,346 children show a median of 127 at birth, about 145 at one month and 113 at two years, and many guideline limits fell outside the healthy range (Fleming and others 2011).

Fever raises the pulse. In 21,033 British children, heart rate rose about 10 beats a minute per °C of fever (Davies and Maconochie 2009). Where There Is No Doctor says 20 (Werner and others 2020). Teach 10. A pulse far above what the fever explains suggests shock. A relatively slow pulse with high fever is old lore for typhoid (Werner and others 2020), not measured in any source read [VERIFY].

The standing test. McGee, Abernethy and Simel reviewed bedside signs of low blood volume. A pulse rise of 30 or more on standing, or dizziness too severe to stand, detected large blood loss with about 97% sensitivity and 96 to 98% specificity, but moderate loss with only 22% sensitivity. For loss from vomiting or diarrhoea, postural signs helped little (LR+ about 1.5 to 1.7). Method: lie 2 minutes, count, stand 1 minute, count again, 30 seconds doubled each time. Postural drop occurs in 11 to 30% of healthy people over 65 (McGee and others 1999).

Pulses and pressure. Trainees were taught that a palpable radial pulse means systolic pressure of at least 80 mmHg. Deakin and Low measured pressure directly in 20 shocked patients: 10 of 12 with all pulses present had systolic pressure below 80 (Deakin and Low 2000). The sample was small, but the safe lesson holds: a missing radial pulse in a warm adult is grave, a present one proves little.

Pulse lore. Herophilus is said to have timed the pulse against a water clock, Galen described 27 qualities of a beat in some 18 books, Sanctorius built a pendulum pulsilogium, and Sir John Floyer of Lichfield published The Physician's Pulse-Watch in 1707 with a watch by Samuel Watson that had a second hand. Floyer drew heavily on Chinese pulse literature and kept Galenic theory (Floyer history 2016). The old examiners got rate, rhythm, strength and the link to fever right. The dozens of named qualities mapped to organs have not held up.

Chinese and Ayurvedic practice reads three positions and three depths on each wrist. In a 2012 thesis, four testers examined 15 volunteers twice. Good agreement (kappa 0.60 or more) occurred in 67% of comparisons within a tester and 44% between testers (UTS thesis 2012). Two experts examining 658 Korean stroke patients agreed poorly to moderately, and an Ayurvedic study of 15 doctors found weighted kappas from below zero to 0.56 (secondary summaries, references not confirmed [VERIFY]). Edzard Ernst argues that a method two practitioners cannot agree on cannot guide treatment (Ernst, blog). The fair reading: rate, rhythm, force and the thready pulse of shock are real and shared with Western practice. The organ map is unreliable theory. Grade B for rate and character, D for the map.

1.4 Temperature

By touch. The back of one hand on the patient's forehead, the other on a healthy person's (Werner and others 2020). A review of ten studies (3,694 children) found sensitivity 89.2% and specificity 50% (CRD review), and Li and colleagues found 87.5% and 54.6%, LR- 0.23 (Li and others 2017). Touch rules fever out better than in. In a Nigerian study with much fever, a "not hot" judgement had a negative predictive value of only 21% (BMJ Open 2014). Grade B.

By thermometer. Wunderlich fixed 37°C as normal using a thermometer later found to read high. Mackowiak and colleagues measured 148 healthy adults: mean oral temperature 36.8°C, upper limit 37.7°C (37.2°C early morning), lowest at 6 a.m., daily swing about 0.5°C (Mackowiak and others 1992). Leave a glass thermometer 3 to 4 minutes. Armpit reads a little lower, rectal a little higher. Mercury is poisonous. A newborn below 36°C may have serious

infection (Werner and others 2020). Measured fever over 38°C was only weakly linked to pneumonia (LR+ 1.36) (Rees and others 2020). Fever says there is a fight, not where.

1.5 Circulation and water

Capillary refill. Press a fingertip or the skin over the breastbone until it blanches, release, and count seconds to pink [VERIFY press duration, often given as 5 seconds]. Schriger and Baraff timed 304 healthy people: the upper limit was about 2 seconds in children and men, 2.9 in women and 4.5 in the elderly, lengthening about 3.3% per decade and 5% per °C fall in skin temperature (Schriger and Baraff 1988). Cold rooms and age slow it. Steiner's review of dehydration in young children found abnormal refill the best single sign (LR+ 4.1, 95% CI 1.7 to 9.8), ahead of skin turgor (2.5) and abnormal breathing (2.0), though none of the 13 studies was of high quality and a normal refill did not exclude dehydration (Steiner and others 2004). In Tanzania, refill over 3 seconds carried an odds ratio for death of 9.0 (Clifton and others 2012).

Skin pinch and sunken eyes. IMCI pinches the belly skin. "Very slowly" means over 2 seconds. Severe dehydration is two of: lethargic or unconscious, sunken eyes, drinking poorly or not at all, pinch very slow. Some dehydration is two of: restless or irritable, sunken eyes, drinks eagerly, pinch slow (WHO 2014). The pinch is slow anyway in severe wasting and may be fast in a fat or oedematous child (older IMCI training materials, not re-read [VERIFY]).

Combinations beat single signs. Gorelick and colleagues examined 186 children and measured true deficit by weight gain after treatment. Three or more of ten signs detected a deficit of 5% or more with 87% sensitivity and 82% specificity. Four signs did as well as ten: capillary refill over 2 seconds, absent tears, dry mucous membranes, ill appearance. Two or more of these four means a deficit of at least 5% (Gorelick and others 1997), with LR+ about 6.1 (WikEM). Grade B.

Urine colour. Armstrong's eight-shade chart correlated with urine concentration (r 0.40 to 0.93), less well in children, the old and pregnancy (Armstrong 1994). Dark scanty urine supports dehydration.

A warning. The FEAST trial gave 3,141 African children with fever and poor perfusion either rapid fluid boluses or maintenance fluid. Boluses raised 48-hour mortality from 7.3% to 10.5% (Maitland and others 2011). The signs were right. The reflex response killed. A sign says the child is in danger, not that a particular treatment will help.

1.6 Colour: pallor, jaundice, cyanosis

Pallor. Look where dark skin cannot hide colour: palms, nails, inside lips and eyelids (Werner and others 2020). Chalco and colleagues pooled eleven studies. At haemoglobin below 11 g/dL, conjunctival pallor had sensitivity 43.6% and specificity 81.4%, palmar 39.2% and 86.7%, nail bed 29.2% and 88.5% (Chalco and others 2005). In Uganda and Bangladesh, severe pallor detected severe anaemia with only 10 to 50% sensitivity but 99% specificity. Adding grunting raised sensitivity to 37 to 80%, and about half of non-anaemic children were wrongly called anaemic (Kalter and others 1997a). Pallor confirms severe anaemia when obvious and misses most of the rest. Chalco's group suggested giving iron to all children in high-prevalence areas instead. Grade B for severe pallor, C for mild.

The Haemoglobin Colour Scale. A card of six reds standing for 40, 60, 80, 100, 120 and 140 g/L, matched against a drop of blood on standard chromatography paper, developed by Stott and Lewis. Across 14 primary-care studies its sensitivity for anaemia was 80% (68 to 88) against 52% (36 to 67) for clinical assessment, with similar specificity (80% against 75%). For severe anaemia: 57% and 99.6% against 45% and 92%. Scale plus clinical signs raised sensitivity to 91% at 59% specificity (Marn and Critchley 2016). An earlier review found sensitivity 75 to 97%, better in laboratories than in the field (Critchley and Bates 2005). After the Fall it exists only if salvaged with its paper. Grade A where it exists.

Jaundice. In a blinded survey, 62 observers examined six patients. At a bilirubin of 2.5 mg/dL (about 43 μmol/L [VERIFY conversion]) only 58% saw yellow sclerae, at 3.1 mg/dL 68%, and students gave most of the false calls (Ruiz

and others 1997). Jaundice a healer can see is already substantial. In newborns, Kramer's zones (head to feet) correlate with bilirubin but with wide spread, worst in dark skin. No visible jaundice means low risk (AAFP 2000). Among primary health workers, jaundice of palms or soles, or deep jaundice of trunk or head, detected bilirubin over 340 μmol/L with 89 to 100% sensitivity (BMJ Open 2021).

Cyanosis. Comroe and Botelho had subjects breathe low-oxygen air. A quarter of observers missed definite cyanosis at saturations of 71 to 75%, while 6% called it at 96 to 100%. With normal haemoglobin it appears near 80% saturation, and with severe anaemia it may not appear at all (Comroe and Botelho 1947). Dark skin hides it further. Central cyanosis on tongue and lips is a late and grave sign. Its absence reassures no one. Grade B as a red flag, X as reassurance.

1.7 The chest by ear and hand

History. Leopold Auenbrugger, son of a Graz innkeeper, published Inventum novum in Vienna in 1761. The story that he learned percussion from his father's wine casks is anecdote. Corvisart's translation of 1808 made it known (Stanford Medicine 25 2014). In 1816 René Laennec, at the Necker Hospital in Paris, rolled a quire of paper into a tube to hear a patient's heart, then turned wooden cylinders about 25 cm long. His De l'auscultation médiate of 1819 named rales and egophony. He died of tuberculosis in 1826 (BSHM, Cardiology Journal). Details of the patient come from secondary accounts [VERIFY]. A paper tube needs one sheet of paper and is more decent than an ear on a woman's chest, which was Laennec's own reason.

Accuracy. In five studies (934 patients), dullness to percussion had LR+ 8.7 (2.2 to 33.8) for pleural effusion, the strongest single chest finding, and normal vocal fremitus made effusion unlikely (LR- 0.21) (Wong and others 2009). A secondary review quotes 5.7 from the same group [VERIFY]. For adult pneumonia, dullness had LR+ 2.2 to 4.3, bronchial breathing 3.5, egophony 2.0 to 8.6, crackles 1.6 to 2.7, with most negative LRs between 0.6 and 0.95 (Metlay and others 1997). Three examiners in one study ranged in sensitivity from 0.47 to 0.69 (Wipf and others 1999). When 24 physicians examined 24 patients, the most reliable signs reached kappa about 0.5 (Spiteri and others 1988). Teach three things: dullness on one side, silence on one side, wheeze. None should overrule fast breathing or a danger sign. Grade B for dullness, C for the rest.

1.8 The belly

Ask the patient to point with one finger. Look for swelling. Press gently, starting away from the pain. A belly hard as a board, that the patient cannot relax, suggests peritonitis or appendicitis. Listen if there is vomiting and no stool. Silence for about 2 minutes is a danger sign, "a silent belly is like a silent dog" (Werner and others 2020).

For appendicitis, rigidity had LR+ 2.96, guarding 2.48 and percussion tenderness 2.86. Combinations with a raised white count reached 11.3 (Andersson 2004). Rebound tenderness ranged from 1.1 to 6.3 and is better tested by gentle percussion than by painful sudden release (AAFP 1999). The silent belly is weaker than its fame. When 53 doctors listened to recordings from 98 patients, sensitivity for obstruction was 0.42, specificity 0.78 and agreement poor (kappa 0.29). Seniors did no better (Breum and others 2015). The dangerous belly is the rigid one, in a patient lying still who hurts with every jolt. Most such patients need surgery the village cannot give. The value of the examination is early, honest recognition.

1.9 The neurological screen

Consciousness. AVPU asks whether the patient is Alert, responds to Voice, only to Pain, or is Unresponsive. In 1,384 poisoned patients, "P" matched a Glasgow score of about 8, where the airway is at risk (Kelly and others 2004). A later study found a median of 8 (7 to 10) (Rajabi Kheirabadi and others 2015).

Pupils. A large difference is almost always an emergency, especially after head injury (Werner and others 2020).

Stroke. Smile, arms out with eyes closed, repeat a sentence. In 171 patients any abnormal item detected stroke with

66% sensitivity and 87% specificity, 88% for strokes in the front of the brain (Kothari and others 1999). Later pooled estimates are higher but less specific, not read in full [VERIFY].

Meningitis. This overturns a teaching. In 297 adults with suspected meningitis, Kernig's sign and Brudzinski's sign each had 5% sensitivity and neck stiffness 30%, with LR+ about 0.95: they did not separate patients with meningitis from those without (Thomas and others 2002). In Tanzanian children a stiff neck did predict death (OR 7.0) (Clifton and others 2012), and IMCI keeps it as a sign of very severe febrile disease (WHO 2014). A stiff neck with fever is a red flag. A supple neck excludes nothing.

1.10 Urine by eye, smell and taste

Tradition. Isaac Judaeus (about 850 to 932) wrote the treatise that, translated by Constantine the African, dominated European teaching. Gilles de Corbeil, born about 1140, versified it in 352 lines. Urine was held up in the matula and read against wheels of 20 colours, such as Ulrich Pinder's of 1506. Printing spread the wheels to quacks, and Thomas Linacre's College of Physicians is credited with a statute against diagnosing on urine alone (Uroweb history, Rylands 2020). Ayurveda's taila bindu pariksha drops sesame oil on morning urine and reads its spread. Small studies suggest it changes with uncontrolled diabetes (Ayu 2011, Journal of AYUSH 2026). Grade D.

What was real.

1. **Sweetness.** Sushruta's school named madhumeha, honey urine, from urine that drew ants. Thomas Willis in 1674 called diabetic urine sweet as honey. Matthew Dobson of Liverpool evaporated it to a sugar residue (1772 experiment, 1776 publication [VERIFY]). Ants are still mentioned as a diagnostic aid in parts of Africa (IBMS history, Hektoen 2025). Grade B. Ants on dried urine replace tasting.
2. **Protein.** Dekkers (1694) saw some urine clot on heating, Cotugno found it in dropsy, and Richard Bright in 1827 tied coagulable urine and dropsy to diseased kidneys in 23 cases, boiling urine in a spoon over a candle (Hektoen 2017). This is a hearth test for protein in pregnancy and kidney disease. The vinegar step to clear harmless phosphate cloudiness was not confirmed [VERIFY]. Grade C.
3. **Blood.** Visible blood in urine marks Schistosoma haematobium. Questionnaires were validated in 10 African countries with 133,880 children (Lengeler and others 2002). At school level in Kenya, sensitivity was 91.7% and specificity 100% (Kenya validation 2013). For an individual in Egypt, 54.4% and 90.8% (Egypt study). Grade B for communities, C for individuals.
4. **Colour and quantity.** Dark scanty urine means concentration (Armstrong 1994). Very low output is a late sign of dying (Hui and others 2014).

What was wrong was the belief that a wheel could name diseases of the whole body. Tasting urine risks infection [VERIFY: inference], and the book should not teach it.

1.11 Stool, sputum and breath

Stool. The Taiwanese infant stool colour card lets parents compare stool with pictured colours. Pale or putty stools mean blocked bile ducts (biliary atresia). In 78,184 infants it had sensitivity 89.7%, specificity 99.9% and positive predictive value 28.6% (Hsiao and others 2006). Surgery before 60 days rose from 49.4% to 65.7% (Hsiao and others 2008), and three-year survival from 64.0% to 89.2% (Lien and others 2011), comparisons against history. After the Fall the operation is gone, so the card gives honest early knowledge, not cure. No accuracy study of the "rice-water" stool of cholera was found [VERIFY].

Sputum. In 241 German patients with cough, coloured sputum detected bacterial infection with sensitivity 79%, specificity 46% and LR+ 1.46 (Altiner and others 2009). In chronic bronchitis flare-ups, 94.7% and 15% (ERJ 2012). Colour should not decide antibiotics. Grade C to X.

Breath.

- **Acetone**, sweet and nail-varnish-like, in diabetic ketoacidosis or starvation. Breath acetone reached 474 ppm in one study (Oxford study). Human odour thresholds vary widely between people [VERIFY range of about 20 to 400 ppm], and some cannot smell it at all (GPnotebook). With deep sighing breathing and thirst it is a strong clue [VERIFY: no accuracy study].
- **Fetor hepaticus**, musty, from dimethyl sulphide in liver failure. Breath analysis of 52 patients separated them from volunteers, but no study tested a clinician's nose (Van den Velde and others 2008).
- **Uraemic fetor**, fishy or ammonia, in kidney failure. Breath ammonia tracks urea and fell tenfold after dialysis (PLoS ONE 2012).

All three are late grade C clues.

1.12 Arm and feet

IMCI measures mid-upper-arm circumference (MUAC) from 6 months. Below 115 mm is severe acute malnutrition, 115 to 125 mm moderate. Pitting oedema of both feet is severe whatever the arm (WHO 2014). MUAC predicted death better than weight-for-height (Briend and others 2012), and monthly repeats caught more children who later died (Briend and others 2023). A marked string is enough. Grade B.

1.13 The signs of the dying

Hui and colleagues recorded signs every 12 hours in 357 patients with advanced cancer in Texas and Brazil. Early signs were common but non-specific: falling consciousness (median 4.5 days before death), total dependence (4 days) and inability to swallow liquids (7 days). Late signs, mostly in the last three days, strongly predicted death within three days: no radial pulse (LR+ 15.6), urine under 100 mL in 12 hours (15.2), Cheyne-Stokes breathing (12.4), breathing with the jaw (10) and the death rattle (9). Each appeared in fewer than 60% of the dying, so absence does not mean death is far off (Hui and others 2014). A second analysis added non-reactive pupils (16.7), eyelids that do not close (13.6), grunting (11.8), upper gut bleeding (10.3), reduced response to voice (8.3) and drooping nasolabial folds (8.3) (Hui and others 2015). These are cancer patients and agreement between observers was not checked. Grade B. The use after the Fall is not prediction for its own sake but letting a family gather, stop forcing food and fluid, and keep the mouth moist and the body turned.

1.14 The examination routine, in order

Built from IMCI (WHO 2014), Where There Is No Doctor (Werner and others 2020) and the evidence above, with the weightiest signs first so that an interrupted healer has already found what matters.

1. From the doorway: AVPU, convulsions, breathing noise, grunting, indrawing, lip colour, does the child move on their own.
2. Danger questions: drinking? vomiting everything? fits? feeding (newborn)?
3. Count breaths a full minute.
4. Indrawing, stridor, grunting.
5. Pulse rate, strength, rhythm. Hands and feet warm or cold.
6. Capillary refill.
7. Temperature.
8. Colour in daylight: palms, eyelids, sclerae, tongue.
9. Water: eyes, tears, mouth, skin pinch, last urine.
10. MUAC and both feet for oedema.
11. Neck, pupils, face-arm-speech when relevant.
12. Belly if pain, vomiting or no stools.
13. Chest by tapping and tube if cough or breathlessness.
14. Skin all over, children fully undressed.

15. Urine, stool, sputum, breath as the complaint suggests.
16. Write it down with date and time. Repeat vital signs at least four times a day in the very sick.

Any red flag at steps 1 to 11 changes the plan at once.

2. Evidence grades

Sign	Record	Grade
IMCI general danger signs	Predict death (OR 5 to 9), catch most children needing referral	B
Seven young-infant signs	85% sensitive, 75% specific in week one	B
Fast breathing by age	LR+ about 1 against X-ray, but treatment by it cut pneumonia deaths about a third	B, near A for outcome
Indrawing, stridor, grunting	Validated in IMCI, low specificity against X-ray, grunting specific	B
Pulse rate and strength	Rises about 10 per °C in children, weak fast pulse marks shock	B
Standing pulse rise of 30	97% for large blood loss, 22% for moderate	B
Radial pulse means 80 mmHg	Overestimates pressure	X
Organ-mapped pulse diagnosis	Poor to moderate agreement	D
Fever by touch	Sensitive 87 to 89%, specific 50 to 55%	B
Thermometer	Normal oral upper limit 37.7°C	A
Capillary refill	Best single dehydration sign, OR 9 for death	B
Skin pinch, sunken eyes	Useful in combination, misleading in wasting	B
Four-sign dehydration rule	LR+ about 6	B
Pallor	Severe pallor 99% specific, misses most mild anaemia	B severe, C mild
Haemoglobin Colour Scale	80% sensitive and specific	A
Scleral jaundice	58% of observers at 2.5 mg/dL	B
Newborn jaundice to palms and soles	89 to 100% sensitive for dangerous levels	B
Central cyanosis	Missed by a quarter at 71 to 75% saturation	B as flag, X as reassurance
Percussion dullness	LR+ 8.7 for effusion, 2.2 to 4.3 for pneumonia	B
Crackles, egophony, bronchial breathing	Weak, poor agreement	C
Paper tube or wooden stethoscope	No accuracy study found	C
Rigidity, guarding, percussion tenderness	LR+ about 2.5 to 3 alone, high in combination	B
Bowel sounds, silent belly	42% sensitive, kappa 0.29	X as decider
AVPU	P equals about GCS 8	B

Sign	Record	Grade
Face-arm-speech	66% and up sensitive	B
Kernig and Brudzinski	5% sensitive in adults	X
Stiff neck with fever	30% sensitive in adults, predicts death in children	B as flag, X as rule-out
Sweet urine (ants)	Recognised across Asia, Persia, Africa	B
Bright's heat test	Historical basis of protein testing, no modern accuracy data	C
Reported blood in urine	Excellent for schools, weak for individuals	B or C
Urine wheel uroscopy	Rejected in its own time	X
Taila bindu	Small unstandardised studies	D
Infant stool colour card	89.7% sensitive, 99.9% specific, survival rose	B
Sputum colour	LR+ 1.46	C to X
Breath odours	No bedside accuracy studies	C
MUAC under 115 mm, bilateral oedema	Predicts death better than weight-for-height	B
Late signs of dying	LR+ 9 to 17 for death within 3 days	B

3. Means ledger

Rung	What it adds	What it changes
Hands only	Danger signs, breath count, indrawing, AVPU, pupils, refill, skin pinch, pallor, jaundice, cyanosis, touch for fever, belly, chest by ear, face-arm-speech, signs of dying	Recognises nearly every child needing antibiotics or referral. Without a timer counts drift
Hearth	String pendulum about 25 cm long that swings there and back once a second [VERIFY: physics inference], marked MUAC string, spoon and candle for Bright's test, white cloth and glass for urine and stool colour	Accurate counts without a watch, malnutrition screening, protein in pregnant women's urine
Garden and still	Salvaged glass thermometer cleaned with alcohol, turned wooden stethoscope, scale for infant weight, seconds-pendulum clock	Newborn temperature thresholds, weight tracking, better chest hearing
Village dispensary of 300	Written records, wall chart of thresholds, microscope for malaria, urine sediment and schistosome eggs, salvaged colour scale and stool card	Confirms common infections, quantifies anaemia, trains a second healer, audits misses

Rung	What it adds	What it changes
District infirmary of 3,000	Blood pressure cuff, trained clinician, simple urine chemistry while reagents last, salvaged pulse oximeter while batteries last	Measured pressure for pre-eclampsia and shock, oxygen saturation, second opinion
Pre-Fall hospital	X-ray, ultrasound, oximetry, blood tests, cultures, lumbar puncture, CT	Confirms or excludes almost everything here, yet the clinical signs predicted death better than routine laboratory results (Clifton and others 2012)

4. Harm test

The examination seldom injures by itself. It kills through judgement.

False reassurance, the deadliest error. A supple neck does not exclude meningitis (Thomas and others 2002). Pink lips do not exclude low oxygen in the anaemic or dark-skinned (Comroe and Botelho 1947). A radial pulse does not prove adequate pressure (Deakin and Low 2000). Normal refill does not exclude dehydration (Steiner and others 2004). A cool forehead misses fever often (BMJ Open 2014). When a sign is absent, look for the others before reassuring.

False alarm. Over-calling pneumonia spends finite antibiotics (Rees and others 2020). Over-referral exhausts carriers. Students made most false calls of jaundice (Ruiz and others 1997).

The right sign, the wrong treatment. Fluid boluses for poor perfusion raised mortality from 7.3% to 10.5% (Maitland and others 2011).

Physical harm. Mercury from a broken thermometer is poisonous (Werner and others 2020). Deep palpation with sudden release hurts and adds little (AAFP 1999). Bending the neck after a fall or blow risks the spinal cord [VERIFY: inference]. Tasting urine risks infection [VERIFY: inference]. Unwashed hands carry infection between patients [VERIFY: general hygiene, not examined in sources read].

Who is misread. Infants under two months, whose breathing is irregular (Baker and others 2019). Wasted children, whose pinch is falsely slow, and fat or swollen children, whose pinch is falsely fast. Dark-skinned patients for pallor, jaundice and cyanosis. The old, whose refill runs to 4.5 seconds and who often drop pressure on standing (Schriger and Baraff 1988, McGee and others 1999). Anyone in a cold room. Examiners who cannot smell acetone (GPnotebook).

Warning signs that the examination is failing. Green-classified children who die, the same "mild" patient returning worse, two healers who often disagree. Then count together, re-train and review every death.

Historical harm. Uroscopy without the patient became a trade of quacks (Uroweb history). Wunderlich's thermometer fixed a wrong normal for a century (Mackowiak and others 1992). The pulse-pressure rule taught a generation to overestimate blood pressure (Deakin and Low 2000). Kernig's and Brudzinski's signs were taught for a century and miss nearly every adult case (Thomas and others 2002).

5. Red flags

Child 2 months to 5 years: cannot drink or breastfeed, vomits everything, convulsions, lethargic or unconscious (WHO 2014). Indrawing, stridor when calm, grunting, blue lips. Severe palmar pallor. Two signs of severe dehydration. Stiff neck with fever. MUAC under 115 mm or swelling of both feet. Refill over 3 seconds with cold hands

(Clifton and others 2012).

Young infant under 2 months: any of the seven signs (Young Infants Clinical Signs Study Group 2008). Jaundice on palms and soles (BMJ Open 2021). Pale or white stools with jaundice (Hsiao and others 2006).

Adult: AVPU P or U. Breathing over 30, or 22 or more with confusion (Werner and others 2020, Seymour and others 2016). Pulse up 30 on standing after bleeding, or too dizzy to stand (McGee and others 1999). Board-hard belly or a silent swollen belly with vomiting and no stools. Unequal pupils after head injury, sudden one-sided weakness or lost speech. Fever with confusion or stiff neck. Cold grey sweaty skin with a fast weak pulse. Acetone breath with deep sighing breathing. Pregnancy with swelling, headache and protein on the heat test [VERIFY, see pregnancy chapter].

What to do anyway. Send for the most skilled help in reach at once, with the written record. Meanwhile keep the patient warm and on their side if drowsy, clear the airway, give small frequent sips if they can swallow, start the first treatment the relevant chapter allows, and repeat vital signs hourly in writing. When no help exists, say so plainly, give what can be given, and stay.

Honest comfort. When the late signs of dying appear, tell the family that death is likely within days (Hui and others 2014). Stop examinations that only burden. Moisten the mouth, turn gently, keep clean and warm, let familiar voices be heard.

6. The case against

The signs are less reliable than their teachers claimed. Spiteri, Cook and Clarke (1988) showed doctors agree only fairly on chest signs. Breum and colleagues (2015) showed bowel sounds nearly useless. Thomas, Hasbun, Jekel and Quagliarello (2002) showed the meningeal signs miss almost every case. Comroe and Botelho (1947) showed cyanosis is seen erratically. Rees and the WHO PREPARE group (2020) showed the breathing signs barely distinguish radiographic pneumonia. Chalco and colleagues (2005) found pallor so poor they proposed iron for all. On this view a book of signs breeds confident error.

Lay readers will do worse. Community workers counting breaths reached only moderate agreement (Baker and others 2019). Health workers caught uncommon signs 20 to 45% of the time (Simoes and others 1997).

IMCI was validated in particular places, mostly African and South Asian, with malaria, HIV and malnutrition common. A temperate village after the Fall will have other diseases and other trade-offs.

Traditional pulse and urine diagnosis was mostly theory. Ernst makes the case against the pulse map, and Linacre made it against uroscopy five centuries ago.

The response. Most criticism judges signs against a machine. Against death the record is better. Treatment by breathing signs cut pneumonia deaths by about a third (Sazawal and Black 2003). The danger signs predicted death better than the laboratory (Clifton and others 2012). The stool card raised survival (Lien and others 2011). Poor agreement is answered by training, counting twice, combining signs (Gorelick and others 1997), writing everything down and reviewing deaths. Teach the robust signs, demote the weak ones (bowel sounds, Kernig, sputum colour, the pulse map), and never teach an absent sign as reassurance.

Today against after the Fall. Everything in sections 1.1 to 1.13 except the colour scale, the stool card and the thermometer can be done with no supplies at all. The scale and card can be printed and stored now. What the Fall removes is the confirmation and the operation that follow the diagnosis, not the diagnosis.

7. Ten-line summary

1. The IMCI danger signs pick out the children who die (odds ratios 5 to 9) and need no instrument.
2. Seven signs catch 85% of severe illness in the first week of life.
3. Counting breaths against 60, 50 and 40 and treating accordingly cut child pneumonia deaths by about 36%.

4. Capillary refill over 2 to 3 seconds is the best single sign of dehydration and of danger in fever.
5. Two of four signs (slow refill, no tears, dry mouth, ill look) mean a fluid deficit of 5% or more.
6. A pulse rise of 30 on standing detects large blood loss but misses moderate loss.
7. Fever by touch rules fever out better than in. Normal oral temperature reaches 37.7°C.
8. Severe pallor confirms severe anaemia, but pallor misses most mild anaemia. The colour scale does far better.
9. Kernig's and Brudzinski's signs, bowel sounds and sputum colour should decide nothing.
10. No radial pulse, jaw breathing, the rattle and scant urine foretell death within about three days.

8. Open questions

- How well do readers trained from a book alone perform? No study tests it.
- Do IMCI thresholds hold in temperate climates, at altitude and in adults?
- Which pallor site is best? Studies disagree (Chalco and others 2005, Kalter and others 1997a).
- How accurate is an improvised paper or wooden stethoscope? No study found.
- Does Bright's spoon test detect pre-eclampsia early enough to matter? No modern study found.
- Is dullness worth LR+ 8.7 or 5.7 for effusion?
- Do Hui's signs of dying hold outside cancer?
- McGee's Evidence-Based Physical Diagnosis (McGee 2018) and Sapira's textbook could not be accessed. Their likelihood ratios for dry axilla, adult sunken eyes, rigidity and many other signs should be checked before the chapter is written.
- Breath odours have no bedside accuracy studies.

9. Sources to read in full

1. WHO (2014). IMCI Chart Booklet. Every threshold the book should adapt.
2. Werner and others (2020). Where There Is No Doctor, chapter 3. The model of plain teaching.
3. McGee (2018). Evidence-Based Physical Diagnosis. Likelihood ratios for every sign.
4. Young Infants Clinical Signs Study Group (2008). The basis of newborn danger signs.
5. Gorelick and others (1997). The four-sign dehydration rule.
6. Marn and Critchley (2016). Pallor against the colour scale.
7. Thomas and others (2002). Why the meningeal signs fail.
8. Hui and others (2014). Bedside signs of dying.
9. Sazawal and Black (2003). Mortality evidence for counting breaths.
10. Rees and others (2020). Limits of the breathing signs.

At the bedside after the Fall

The household. One person learns the danger signs, the breath thresholds and the 16-step routine by heart. Needed: a pendulum or watch with a second hand, a marked string, daylight, a notebook. If salvaged, a glass thermometer in a padded tin. First failure to expect: a false fast count in a crying child or a false calm count in a drowsy, very sick one. Count twice, calm, a full minute, and watch behaviour as well as numbers.

The village of 300. The healer keeps a dated record for every visit, a wall chart (60, 50, 40, 30, 22, 2 seconds, 115 mm, 37.5 and 35.5°C), a paper tube or wooden stethoscope, MUAC strings, a spoon and candle, a seconds clock and, if salvaged, a microscope, colour scale and stool card. Two healers examine the same patients for the first months until their breath counts agree within about 5 [VERIFY: working tolerance, not from a study]. Keep a death register. First failure to expect: alarm fatigue, then a healer who stops trusting the signs and misses a dying child. A monthly review of every death and every return visit corrects both.

The district of 3,000. The nurse or doctor trains and audits village healers, sees every red-flag patient who can be carried, and holds what cannot be spread thin: a blood pressure cuff, a good stethoscope, the colour scale paper, any

oximeter. Keep the recorded signs of every death against its cause, so the district learns which signs its healers miss. First failure to expect: patients carried too late because the village waited to "see how it goes". Hold the rule that any danger sign means referral now.

Protocols

Protocol 1. The ten-minute examination

1. Wash hands with soap and water.
2. Daylight or a bright lamp. Undress a child fully.
3. From a distance, 30 seconds: record A, V, P or U, convulsions, breathing noise, indrawing, lip colour.
4. Ask: drinking? vomiting everything? fits? last urine?
5. Breaths for 60 seconds. If two counts differ by more than 5, count again and record the higher [VERIFY tolerance].
6. Pulse 30 seconds, doubled. Note strong or weak, regular or irregular.
7. Hands and feet: warm or cold.
8. Capillary refill on the fingertip (breastbone if cold): press until pale, release, count seconds. Over 2 abnormal, over 3 a red flag.
9. Temperature: thermometer 3 to 4 minutes in mouth or armpit, or back of hand against a healthy person.
10. Palms, lower eyelids, sclerae, tongue in daylight.
11. Eyes, tears, mouth, skin pinch on the belly, count seconds.
12. MUAC on the left upper arm halfway between shoulder and elbow. Press both feet with a thumb for 3 seconds and look for a pit [VERIFY 3 seconds].
13. Neck, pupils, face-arm-speech if relevant.
14. Belly and chest if relevant.
15. Write date, time, findings and plan. Circle every red flag.

Protocol 2. Counting breaths in a child

1. Child calm: in the mother's arms, feeding or asleep. Never during crying.
2. Lift clothing. Watch belly or lower chest.
3. One rise and fall is one breath.
4. Count a full 60 seconds against a watch, or a 25 cm string pendulum with a stone, one there-and-back swing a second [VERIFY: physics inference].
5. Fast: under 2 months 60 or more, 2 to 11 months 50 or more, 1 to 5 years 40 or more (WHO 2014).
6. Within 5 of the threshold: count again, use the higher count [VERIFY tolerance].
7. Look for indrawing all the time, listen for stridor and grunting.
8. Fast breathing alone: treat as pneumonia per the respiratory chapter. Indrawing, stridor when calm, grunting, blue lips or any danger sign: severe, start first treatment, refer.

Protocol 3. Dehydration in a child with diarrhoea

1. General state: alert, restless and irritable, or lethargic.
2. Eyes sunken? Ask the mother if they look normal to her.
3. Offer a drink: normal, eager, or poor or none.
4. Skin pinch: belly skin halfway between navel and flank, lengthwise, release. Back at once, slowly, or very slowly (over 2 seconds) (WHO 2014).
5. Refill, tears, wetness inside the mouth.
6. Severe: two of lethargic, sunken eyes, drinks poorly, pinch very slow. Some: two of restless, sunken eyes, drinks eagerly, pinch slow. Otherwise none (WHO 2014).

7. Cross-check: two or more of refill over 2 seconds, no tears, dry mouth, ill look means at least 5% loss (Gorelick and others 1997).
8. Wasted child: pinch slow anyway. Plump or swollen child: pinch fast anyway.
9. Re-examine every 1 to 2 hours while rehydrating [VERIFY interval, see rehydration chapter].

Protocol 4. Standing pulse after bleeding (adults)

1. Lie flat and still 2 minutes.
2. Pulse 30 seconds, doubled. Write it down.
3. Stand, supported. Too dizzy to stand counts as positive. Stop.
4. After 1 minute standing, pulse 30 seconds, doubled.
5. Rise of 30 or more: large blood loss (McGee and others 1999). Lie down, raise legs, stop bleeding, refer.
6. Smaller rise excludes nothing. Keep watching.
7. Not useful for diarrhoea or vomiting. Less reliable over 65.

Protocol 5. Fever

1. No thermometer: back of hand on patient's forehead, other hand on a healthy person's. Hotter suggests fever. Not hotter does not exclude it in a sick child.
2. Glass thermometer: clean with soap or alcohol, shake below 36°C, under the tongue with mouth shut or deep in the armpit, 3 to 4 minutes (Werner and others 2020).
3. Adult oral above 37.7°C is above normal (Mackowiak and others 1992). Young infant 37.5°C or more, or below 35.5°C, is a danger sign (Young Infants Clinical Signs Study Group 2008).
4. In the very sick, at least 4 times a day.
5. A child's pulse rises about 10 per °C (Davies and Maconochie 2009). Much more suggests shock.

Protocol 6. Urine at the hearth

1. First morning urine, mid-stream, in a clear glass, in daylight against white cloth.
2. Pale straw normal. Dark and scanty: give fluids. Red or brown: blood, ask about schistosomiasis in the village. Dark tea urine with pale stools: blocked bile [VERIFY].
3. Sugar without tasting: a few drops on a tile in the sun beside plain water. Ants gathering on the urine only suggest sugar [VERIFY method, historical basis only].
4. Protein: about 5 mL in a clean metal spoon over a candle until it just boils. Cloudiness or clots that stay suggest protein. Then 2 to 3 drops of vinegar: phosphate cloudiness clears, protein stays [VERIFY vinegar step and quantities].
5. Test every pregnant woman with swelling or headache.
6. Never taste urine. Record date and result.

Protocol 7. Newborn check (0 to 59 days)

1. Watch a feed. Ask about fits.
2. Moves on its own, only when touched, or not at all?
3. Breaths 60 seconds. 60 or more is fast.
4. Severe chest indrawing?
5. Armpit temperature: 37.5°C or more, or below 35.5°C, is a danger sign. Without a thermometer, cold feet and belly in a still baby are a warning [VERIFY touch method].
6. Any of the seven signs: keep warm, keep feeding, first antibiotic dose per the newborn chapter, refer (Young Infants Clinical Signs Study Group 2008).

7. Jaundice: press skin of forehead, chest, belly, thighs, then palms and soles in daylight. Yellow palms or soles: danger (BMJ Open 2021).
8. Pale, white or clay stools after the first week: danger (Hsiao and others 2006).

Protocol 8. Neurological screen

1. AVPU. P or U: on the side, airway clear, refer.
2. Pupils: equal, reacting? A big difference is an emergency.
3. Smile. Arms out, palms up, eyes closed, 10 seconds. Repeat a sentence. Any abnormal: possible stroke (Kothari and others 1999).
4. Grip both hands, push both feet, raise each leg. Compare sides.
5. Fever: can the chin touch the chest? Stiff: red flag. Supple: excludes nothing. Never bend the neck after a fall or blow [VERIFY].
6. Record the time each finding was first seen.

Protocol 9. The last days

1. Early, over a week: sleeping most of the time, cannot swallow liquids, needs total care (Hui and others 2014).
2. Late, often the last 3 days: no wrist pulse, urine under about half a cup in 12 hours, breathing with long pauses or with the jaw, the rattle, pupils not reacting, eyelids not closing (Hui and others 2014, 2015).
3. Two or more late signs: tell the family gently and plainly.
4. Stop measurements that only distress. Moisten the mouth hourly with a clean wet cloth. Turn every 2 to 4 hours [VERIFY intervals]. Keep warm and clean.
5. Record time of death and the preceding signs for the district register.

Numbers to carry

1. **60, 50, 40.** Fast breathing under 2 months, 2 to 11 months, 1 to 5 years. Full minute (WHO 2014).
2. **Five danger signs.** Cannot drink, vomits everything, convulsions, convulsing now, lethargic or unconscious (WHO 2014).
3. **37.5 and 35.5.** Newborn temperature limits in °C (Young Infants Clinical Signs Study Group 2008).
4. **2 seconds.** Very slow skin pinch, and upper limit of normal capillary refill in children (WHO 2014, Schriger and Baraff 1988).
5. **2 of 4.** Slow refill, no tears, dry mouth, ill look: at least 5% fluid loss (Gorelick and others 1997).
6. **30.** Pulse rise on standing after bleeding, and adult breathing rate that suggests pneumonia (McGee and others 1999, Werner and others 2020).
7. **10 per degree.** Pulse rise per °C of fever in a child (Davies and Maconochie 2009).
8. **115 mm.** Arm circumference below which a child is severely malnourished (WHO 2014).
9. **37.7.** Upper limit of normal adult oral temperature in °C (Mackowiak and others 1992).
10. **3 days.** Late signs of dying foretell death within about three days (Hui and others 2014).

References

1. Gove S, for the WHO Working Group on Guidelines for Integrated Management of the Sick Child (1997). Integrated management of childhood illness by outpatient health workers: technical basis and overview. Bulletin of the World Health Organization 75 Suppl 1: 7-24. https://pmc.ncbi.nlm.nih.gov/articles/PMC2486995 (abstract read via search summary).
2. Weber MW, Mulholland EK, Jaffar S, Troedsson H, Gove S, Greenwood BM (1997). Evaluation of an algorithm for the integrated management of childhood illness in an area with seasonal malaria in the Gambia.

Bulletin of the World Health Organization 75 Suppl 1. Exact URL not confirmed [VERIFY] (abstract read via search summary).

3. Perkins BA and others (1997). Evaluation of an algorithm for integrated management of childhood illness in an area of Kenya with high malaria transmission. Bulletin of the World Health Organization 75 Suppl 1. Exact URL not confirmed [VERIFY] (abstract read via search summary).
4. Simoes EA and others (1997). Performance of health workers after training in integrated management of childhood illness in Gondar, Ethiopia. Bulletin of the World Health Organization 75 Suppl 1. Exact URL not confirmed [VERIFY] (abstract read via search summary).
5. Kalter HD and others (1997a). Evaluation of clinical signs to diagnose anaemia in Uganda and Bangladesh, in areas with and without malaria. Bulletin of the World Health Organization 75 Suppl 1: 103-111. https://pmc.ncbi.nlm.nih.gov/articles/PMC2486990 (abstract read).
6. Kalter HD and others (1997b). Validation of the IMCI guidelines for referral in Bangladesh. Bulletin of the World Health Organization 75 Suppl 1. Exact title and URL not confirmed [VERIFY] (abstract read via search summary).
7. Young Infants Clinical Signs Study Group (2008). Clinical signs that predict severe illness in children under age 2 months: a multicentre study. Lancet 371: 135-142. https://ecommons.aku.edu/pakistan_fhs_mc_women_childhealth_paediatr/60 (abstract and secondary summaries read).
8. Clifton DC and others (2012). Predicting mortality for paediatric inpatients where malaria is uncommon. Archives of Disease in Childhood 97(10): 889-894. https://adc.bmj.com/content/97/10/889 (abstract read via search summary).
9. JAMA Pediatrics (2025, authors not recorded in what I read). Clinical signs associated with mortality and sepsis in young infants: a systematic review and meta-analysis. https://jamanetwork.com/journals/jamapediatrics/fullarticle/2844622 (abstract read via search summary).
10. Rees CA and others, WHO PREPARE study group (2020). An analysis of clinical predictive values for radiographic pneumonia in children. BMJ Global Health 5: e002708. https://pmc.ncbi.nlm.nih.gov/articles/PMC7430338 (full text read).
11. Sazawal S, Black RE, Pneumonia Case Management Trials Group (2003). Effect of pneumonia case management on mortality in neonates, infants, and preschool children: a meta-analysis of community-based trials. Lancet Infectious Diseases 3: 547-556. URL not confirmed [VERIFY] (abstract and DARE summary read via search).
12. Baker K and others (2019). Performance of four respiratory rate counters to support community health workers to detect the symptoms of pneumonia in children in low resource settings. EClinicalMedicine. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6677646/ (abstract read via search summary).
13. World Health Organization (2014). Integrated Management of Childhood Illness: Chart Booklet. WHO, Geneva, ISBN 978 92 4 150682 3. https://apo.who.int/publications/i/item/9789241506823 (read via unofficial copy at https://www.slideshare.net/slideshow/imci-2014-who-chartbook-eng/59976791).
14. WHO Bulletin (2003). Public Health Classics commentary on case management of acute respiratory infection and the derivation of breathing thresholds. Bulletin of the World Health Organization 81(4): 298-300. https://scielosp.org/article/bwho/2003.v81n4/298-300 (secondary summary read via search).
15. Werner D, Thuman C, Maxwell J (2020 edition). Where There Is No Doctor, chapter 3: How to Examine a Sick Person. Hesperian Health Guides. https://hesperian.org/wp-content/uploads/pdf/en_wtnd_2020/en_wtnd_2020_03.pdf (full chapter read).
16. Fleming S and others (2011). Normal ranges of heart rate and respiratory rate in children from birth to 18 years of age: a systematic review of observational studies. Lancet 377: 1011-1018. https://pubmed.ncbi.nlm.nih.gov/21411136/ (abstract read).
17. Davies P, Maconochie I (2009). The relationship between body temperature, heart rate and respiratory rate in children. Emergency Medicine Journal 26(9): 641-643. https://emj.bmj.com/content/26/9/641 (abstract

read).
18. McGee S, Abernethy WB, Simel DL (1999). Is this patient hypovolemic? JAMA 281: 1022-1029. https://www.aafp.org/afp/1999/0915/p1220a.html (secondary summaries only).
19. Deakin CD, Low JL (2000). Accuracy of the advanced trauma life support guidelines for predicting systolic blood pressure using carotid, femoral, and radial pulses: observational study. BMJ 321: 673. https://pmc.ncbi.nlm.nih.gov/articles/PMC27481 (abstract and BestBETs summary read).
20. Floyer history (2016, author not recorded in what I read). Sir John Floyer and the Physician's Pulse-Watch. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5195217/ (secondary summary read via search).
21. UTS thesis (2012, author not recorded in what I read). Investigating the reliability of contemporary Chinese pulse diagnosis as a diagnostic tool in Oriental medicine. University of Technology Sydney. https://opus.lib.uts.edu.au/handle/10453/20435 (abstract read).
22. Ernst E. Blog posts on the reliability of pulse diagnosis. https://edzardernst.com/tag/false-negative/ (secondary summary read via search).
23. Centre for Reviews and Dissemination (CRD review, DARE record). Review of the accuracy of tactile assessment of fever. https://www.ncbi.nlm.nih.gov/books/NBK75333/ (abstract read via search summary).
24. Li ZJ, Zhou Q, Li Y (2017). Accuracy of tactile assessment of fever in children by caregivers: a systematic review and meta-analysis. Indian Pediatrics 54: 215-221. https://indianpediatrics.net/mar2017/mar-215-221.htm (abstract read).
25. BMJ Open (2014, authors not recorded in what I read). Accuracy of mothers' tactile assessment of fever in Nigerian children. https://pmc.ncbi.nlm.nih.gov/articles/PMC4194747 (abstract read via search summary).
26. Mackowiak PA, Wasserman SS, Levine MM (1992). A critical appraisal of 98.6°F, the upper limit of the normal body temperature, and other legacies of Carl Reinhold August Wunderlich. JAMA 268(12): 1578-1580. https://pubmed.ncbi.nlm.nih.gov/1302471/ (abstract read).
27. Steiner MJ, DeWalt DA, Byerley JS (2004). Is this child dehydrated? JAMA 291(22): 2746-2754. https://pubmed.ncbi.nlm.nih.gov/15187057/ (abstract read).
28. Gorelick MH, Shaw KN, Murphy KO (1997). Validity and reliability of clinical signs in the diagnosis of dehydration in children. Pediatrics 99(5): E6. https://www.qxmd.com/r/9113963 (abstract read). Four-sign LR+ from WikEM: https://wikem.org/wiki/Template:Pediatric_signs_of_dehydration (secondary).
29. Schriger DL, Baraff L (1988). Defining normal capillary refill: variation with age, sex, and temperature. Annals of Emergency Medicine 17(9): 932-935. Secondary summaries at https://www.crisis-medicine.com/capillary-refill-time-theoretical-but-not-sound/ and https://gpnotebook.com/en-AU/pages/paediatrics/capillary-refill-time (original not read).
30. Maitland K and others (2011). Mortality after fluid bolus in African children with severe infection (FEAST). New England Journal of Medicine 364: 2483-2495. https://www.thebottomline.org.uk/summaries/FEAST/ (secondary summaries only).
31. Armstrong LE and others (1994). Urinary indices of hydration status. International Journal of Sport Nutrition 4(3): 265-279. Read via review at https://pmc.ncbi.nlm.nih.gov/articles/PMC8069841 (secondary).
32. Chalco JP, Huicho L, Alamo C, Carreazo NY, Bada CA (2005). Accuracy of clinical pallor in the diagnosis of anaemia in children: a meta-analysis. BMC Pediatrics 5: 46. https://pmc.ncbi.nlm.nih.gov/articles/PMC1325025 (abstract and tables read).
33. Marn H, Critchley JA (2016). Accuracy of the WHO Haemoglobin Colour Scale for the diagnosis of anaemia in primary health-care settings in low-income countries: a systematic review and meta-analysis. Lancet Global Health 4: e251-e265. https://openaccess.sgul.ac.uk/id/eprint/107828 (full text read).
34. Critchley J, Bates I (2005). Haemoglobin colour scale for anaemia diagnosis where there is no laboratory: a systematic review. International Journal of Epidemiology 34(6): 1425-1434. https://archive.lstmed.ac.uk/1906 (abstract read via search summary).
35. Ruiz MA, Saab S, Rickman LS (1997). The clinical detection of scleral icterus: observations of multiple examiners. Military Medicine 162. https://acnpsearch.tweb-dev.unibo.it/singlejournalindex/8991575 (abstract

read via search summary).
36. BMJ Open (2021, authors not recorded in what I read). Visual assessment of neonatal jaundice by primary health workers and physicians in low- and middle-income settings. BMJ Open 11(12): e048145. https://bmjopen.bmj.com/content/11/12/e048145.full.pdf (abstract read via search summary).
37. AAFP (2000). Tips from other journals: accuracy of clinical judgement in neonatal jaundice, summarising Kramer 1969 and later work. American Family Physician. https://www.aafp.org/afp/2000/1015/p1880a (secondary).
38. Comroe JH, Botelho S (1947). The unreliability of cyanosis in the recognition of arterial anoxemia. American Journal of the Medical Sciences. Read only via secondary summaries: https://www.emedicine.com/med/topic3002.htm and https://ronlitman.substack.com/p/remembering-the-classics-cyanosis.
39. British Society for the History of Medicine (BSHM). The story of the stethoscope. https://bshm.org.uk/the-story-of-the-stethoscope/, with Cardiology Journal, history of the stethoscope and Laennec, https://journals.viamedica.pl/cardiology_journal/article/download/21677/17281 (secondary summaries read via search).
40. Stanford Medicine 25 (2014). The birth of percussion. https://stanfordmedicine25.stanford.edu/blog/archive/2014/The-Birth-of-Percussion.html, with Hektoen International, From woodpeckers to Auenbrugger, https://hekint.org/2020/08/26/from-woodpeckers-to-auenbrugger/ (secondary summaries read via search).
41. Metlay JP, Kapoor WN, Fine MJ (1997). Does this patient have community-acquired pneumonia? JAMA 278: 1440-1445. Read via University of Washington summary: https://depts.washington.edu/physdx/pulmonary/evid1.html (secondary).
42. Wipf JE and others (1999). Diagnosing pneumonia by physical examination: relevant or relic? Archives of Internal Medicine. Read via the same University of Washington summary: https://depts.washington.edu/physdx/pulmonary/evid1.html (secondary).
43. Spiteri MA, Cook DG, Clarke SW (1988). Reliability of eliciting physical signs in examination of the chest. Lancet 1(8590): 873-875. Secondary summary only: https://blogs.the-hospitalist.org/content/how-accurate-clinical-diagnosis-pneumonia.
44. Wong CL, Holroyd-Leduc J, Straus SE (2009). Does this patient have a pleural effusion? JAMA 301(3): 309-317. https://www.qxmd.com/r/19155458 (abstract read).
45. Andersson RE (2004). Meta-analysis of the clinical and laboratory diagnosis of appendicitis. British Journal of Surgery 91: 28-37. Read via RCEM Learning table: https://www.rcemlearning.co.uk/modules/appendicitis-in-a-patient-with-right-iliac-fossa-pain/lessons/investigations-35/topic/likelihood-ratios-2/ (secondary).
46. AAFP (1999). Acute appendicitis: review and update. American Family Physician. https://www.aafp.org/pubs/afp/issues/1999/1101/p2027.html (secondary summary read via search).
47. Breum BM and others (2015). Accuracy of abdominal auscultation for bowel obstruction. World Journal of Gastroenterology 21(34): 10018-10024. https://www.wjgnet.com/1007-9327/full/v21/i34/10018.htm (abstract read).
48. Thomas KE, Hasbun R, Jekel J, Quagliarello VJ (2002). The diagnostic accuracy of Kernig's sign, Brudzinski's sign, and nuchal rigidity in adults with suspected meningitis. Clinical Infectious Diseases 35: 46-52. https://academic.oup.com/cid/article/35/1/46/281915 (abstract read).
49. Kothari RU and others (1999). Cincinnati Prehospital Stroke Scale: reproducibility and validity. Annals of Emergency Medicine 33: 373-378. https://pubmed.ncbi.nlm.nih.gov/10092713/ (abstract read).
50. Kelly CA, Upex A, Bateman DN (2004). Comparison of consciousness level assessment in the poisoned patient using the alert/verbal/painful/unresponsive scale and the Glasgow Coma Scale. Annals of Emergency Medicine 44(2): 108-113. Secondary summary: https://clinician.nejm.org/measuring-consciousness-poisoned-patients-avpu-vs-gcs-EM200409290000007.
51. Rajabi Kheirabadi and others (2015). Recommendation of AVPU plus scale. Asia Pacific Journal of Medical

Toxicology. https://apjmt.mums.ac.ir/article_5080.html (abstract read via search summary).
52. Seymour CW and others (2016). Assessment of clinical criteria for sepsis for the Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3). JAMA 315(8): 762-774. https://discovery.ucl.ac.uk/id/eprint/1489588/ (abstract read).
53. European Association of Urology History Office (Uroweb history). Uroscopy. https://history.uroweb.org/history-of-urology/diagnosis/looking-at-the-urine/uroscopy/ (secondary summary read via search).
54. Rylands Collections (2020). White as well water, livid as lead: understanding urine. https://rylandscollections.com/2020/06/11/white-as-well-water-livid-as-lead-understanding-urine-collection-bite/ (secondary summary read via search).
55. Institute of Biomedical Science (IBMS history). History of diabetes mellitus: from tasting to testing. https://www.ibms.org/resources/documents/history-of-diabetes-mellitus/history-of-diabetes-mellitus-from-tasting-to-testing.pdf (secondary summary read via search).
56. Hektoen International (2025). The pissing evil before insulin. https://hekint.org/2025/09/08/the-pissing-evil-before-insulin/ (secondary summary read via search).
57. Hektoen International (2017). History of nephrology: the middle period. https://hekint.org/2017/01/30/history-of-nephrology-the-middle-period/ (secondary summary read via search).
58. Lengeler C, Utzinger J, Tanner M (2002). Questionnaires for rapid screening of schistosomiasis in sub-Saharan Africa. Bulletin of the World Health Organization 80(3): 235-242. https://scielosp.org/article/bwho/2002.v80n3/235-242 (abstract read via search summary).
59. Kenya validation (2013, authors not recorded in what I read). Preparing for national school-based deworming in Kenya: the validation and large-scale distribution of school questionnaires with urinary schistosomiasis. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3558801/ (abstract read via search summary).
60. Egypt study (authors and year not recorded in what I read). Validity of reported haematuria for urinary schistosomiasis in Egypt. Journal of Bioscience and Applied Research. https://jbaar.journals.ekb.eg/article_126468.html (abstract read via search summary).
61. Ayu (2011, authors not recorded in what I read). A study on Tailabindu pariksha: an ancient Ayurvedic method of urine examination as a diagnostic and prognostic tool. https://pmc.ncbi.nlm.nih.gov/articles/PMC3215423 (abstract read via search summary).
62. Journal of AYUSH (2026, authors not recorded in what I read). Assessing Taila Bindu Pariksha as a diagnostic and prognostic test for diabetes mellitus. https://journals.stmjournals.com/joayush/article=2026/view=244082/ (abstract read via search summary).
63. Hsiao CH and others (2006). Screening for biliary atresia by infant stool color card in Taiwan. Pediatrics. https://pubmed.ncbi.nlm.nih.gov/16585309/ (abstract read via search summary).
64. Hsiao CH and others (2008). Universal screening for biliary atresia using an infant stool color card in Taiwan. Hepatology. https://pure.lib.cgu.edu.tw/en/publications/universal-screening-for-biliary-atresia-using-an-infant-stool-col-3/ (abstract read via search summary).
65. Lien TH and others (2011). Effects of the infant stool color card screening program on 5-year outcome of biliary atresia in Taiwan. Hepatology. https://pure.lib.cgu.edu.tw/en/publications/effects-of-the-infant-stool-color-card-screening-program-on-5-yea-3/ (abstract read via search summary).
66. Altiner A and others (2009). Sputum colour for diagnosis of a bacterial infection in patients with acute cough. Scandinavian Journal of Primary Health Care 27: 70-73. https://publications.goettingen-research-online.de/ID-18081 (abstract read via search summary).
67. ERJ (2012, authors not recorded in what I read). Sputum colour and bacteria in chronic bronchitis exacerbations: a pooled analysis. European Respiratory Journal. https://pubmed.ncbi.nlm.nih.gov/22034649/ (abstract read via search summary).
68. Oxford study (authors and year not recorded in what I read). The correlation between breath acetone and

blood beta-hydroxybutyrate in individuals with type 1 diabetes. University of Oxford Research Archive. https://ora.ox.ac.uk/objects/uuid:33b86175-855d-48a2-b64b-172d4bd977c3 (abstract read via search summary).
69. GPnotebook. Ketotic breath. https://gpnotebook.com/en-GB/pages/paediatrics/ketotic-breath (secondary).
70. Van den Velde S and others (2008). GC-MS analysis of breath odor compounds in liver patients. Journal of Chromatography B. https://pherobase.com/literature/data/details/B/30150 (abstract read via search summary).
71. PLoS ONE (2012, authors not recorded in what I read). Breath ammonia and uraemia. https://doaj.org/article/a1c191a0066e4993898628666db03dfa (abstract read via search summary).
72. Briend A and others (2012). Mid-upper arm circumference and weight-for-height to identify high-risk malnourished under-five children. Maternal and Child Nutrition. URL not recorded [VERIFY] (abstract read via search summary).
73. Briend A and others (2023). Prognostic value of different anthropometric indices over different measurement intervals to predict mortality in 6-59-month-old children. Public Health Nutrition 26: 1210-1221. https://epicentre.msf.org/publications/prognostic-value-different-anthropometric-indices-over-different-measurement-intervals (abstract read via search summary).
74. Hui D and others (2014). Clinical signs of impending death in cancer patients. The Oncologist 19: 681-687. https://pmc.ncbi.nlm.nih.gov/articles/PMC4041673 (full text read).
75. Hui D and others (2015). Bedside clinical signs associated with impending death in patients with advanced cancer. Cancer. Read via ASCO Post: https://ascopost.com/issues/march-25-2015/recognizing-physical-signs-associated-with-impending-death-can-assist-clinicians-patients-and-caregivers-with-complex-decisions (secondary).
76. McGee S (2018). Evidence-Based Physical Diagnosis, 4th edition. Elsevier. https://shop.elsevier.com/books/evidence-based-physical-diagnosis/mcgee/978-0-323-75483-5 (not accessed, listed for reading).