MA-05 The newborn: breathing, warmth, cord, feeding and infection

HEALING after the FALL, research library, MA-05

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How to read this report

The birth itself is MA-01, bleeding in the mother MA-02, the traditional attendant TR-14. Feeding beyond the first days, wet-nursing and weaning are MA-06, the sick child over two months MA-07. This report sets the frame both build on: almost everything that saves a newborn is warmth, a clear airway, the mother's own milk and a clean cord, and all four are free. Three voices are kept apart. **Tradition** is what a people say a practice does, **Record** what happened when it was done and counted, **Inference** what physiology says is going on. Where they disagree, the record wins.

Findings by section

1. The size and shape of the problem

In 2024 about 4.9 million children died before five, 2.3 million of them newborns, which is 47 per cent [my arithmetic from the two published totals, not stated in the source] (UN IGME 2026). Of 2.8 million neonatal deaths in 2013, 0.99 million were from preterm birth, 0.64 million from intrapartum complications including asphyxia and 0.43 million from sepsis and severe infection (Oza and Lawn 2014). Preterm birth and intrapartum causes dominate the first week, infections nearly half of deaths in weeks two to four (Lawn 2014).

After the Fall both ends worsen: prematurity is less survivable with no incubator, and infection commoner because the water, the hands and the cord get dirtier. What the village can change is bounded: a baby who does not breathe can be breathed for, a cold baby warmed on a chest, a cord cut clean and left alone, a breast offered in the first hour. The chapter's claim that a trained pair of hands prevents a third of newborn deaths is defensible on the numbers below, but it is a claim about *trained* hands.

2. Breathing: the Golden Minute, and when to stop

Tradition. Nearly every midwifery tradition has something for the baby who does not cry: rubbing the back, blowing into the face, slapping the soles, holding upside down, cold then hot immersion (TR-14, THRIVING library). Rubbing and drying survive testing. The rest do not: "Never hit or hurt a baby or hold her upside down to make her cry" (Hesperian 2026a).

Record. Helping Babies Breathe turns on the Golden Minute: by one minute the baby is breathing or someone is ventilating it. Msemo compared 8,124 births before training at eight Tanzanian hospitals with 78,500 after. Early neonatal deaths within 24 hours fell from 13.4 to 7.1 per 1,000, relative risk 0.53 (0.43 to 0.65), and fresh stillbirths from 19.0 to 14.4, relative risk 0.76 (0.64 to 0.90). Stimulation rose from 47 to 88 per cent, suctioning only from 15

to 22, and face-mask ventilation *fell* from 8.2 to 5.2 (Msemo 2013). That last figure is the one to carry: the gain came from drying and rubbing more babies sooner, not from bagging more.

Replication is partial. Versantvoort rated the studies heterogeneous and declined a strong recommendation (Versantvoort 2020), while eleven studies pooled gave odds ratios of 0.62 for intrapartum stillbirth and 0.67 overall (Agudelo-Pérez 2022). A wider review found an effect on fresh stillbirth and first-day death but **none at seven or twenty-eight days**. That is the honest shape of the benefit: resuscitation rescues the baby from the first hour, not from the first month. Grade B.

Air, not oxygen. Pooled trials of room air against 100 per cent oxygen gave neonatal mortality 8.0 against 13.0 per cent, odds ratio 0.57 (0.42 to 0.78), and a review restricted to 35 weeks or more gave risk ratio 0.73 (0.57 to 0.94) across seven trials (Saugstad 2005, Welsford 2019). Having no cylinder costs nothing here. Grade A for non-inferiority, B for superiority.

Technique without a bag. Hesperian is the only source I found written for someone with nothing, and its rule is the whole of it: "Breathe into the baby using only as much air as you can easily hold in your cheeks. Do not blow." Three to five slow breaths to clear lung fluid, then small puffs about 3 seconds apart, roughly 30 a minute, watching the chest rise (Hesperian 2026a). Protocol 1 gives the sequence. The sources disagree on rate, since Helping Babies Breathe teaches 40 to 60 with a self-inflating bag (Mashao 2024), but the difference is defensible: a mouth delivers a larger, less controlled volume and the risk is bursting a lung. A Bombay and Dar es Salaam pilot found mouth-to-mask no worse than bag-and-mask in term babies, on small numbers (Massawe 1996, secondary summary only). Grade C, by convergence rather than trial. For the heartbeat, feel the cord stump or listen over the chest, count 6 seconds and add a nought: normal 120 to 160, below 100 slow (Hesperian 2026a, Mashao 2024).

When to stop. The brief's lead needs correcting. ILCOR's 2020 review found that of 277 infants resuscitated beyond 10 minutes, 69 per cent died, 18 per cent survived with moderate to severe impairment and 11 per cent survived without it, and of 39 whose heart rate appeared only at or beyond 20 minutes, 15 survived and 6 unimpaired. The recommendation is that "a reasonable timeframe for this change in goals of care is around 20 minutes after birth", weak, very low certainty, and explicitly not 10 (ILCOR 2020). A South African teaching document stops if there is no heart rate through 15 minutes, or if gasping persists after 20 minutes of bag-and-mask (Mashao 2024), and Hesperian agrees at 20. **Twenty minutes** is the number to carry.

3. Warmth: kangaroo mother care and the touch test

Tradition. Carrying a small baby inside the clothes is normal practice over most of the world. What Edgar Rey Sanabria and Héctor Martínez did at the Instituto Materno Infantil in Bogotá in 1978 or 1979, sources differing on the year, was to make it the treatment rather than the background, because premature babies were sharing incubators (UCL n.d.).

Record. Cochrane found mortality risk ratio 0.60 (0.39 to 0.92) at discharge across eight trials and 1,736 low birthweight infants (Conde-Agudelo 2016). The decisive trial randomised 3,211 infants of 1.0 to under 1.8 kg at five hospitals in Ghana, India, Malawi, Nigeria and Tanzania to skin-to-skin started immediately against started after stabilisation. Death by 28 days was 12.0 per cent against 15.7, relative risk 0.75 (0.64 to 0.89), and the trial stopped early. Median contact was 16.9 hours a day against 1.5, hypothermia fell from 8.3 to 5.6 per cent and suspected sepsis from 27.8 to 22.9 (WHO Immediate KMC Study Group 2021). Grade A. They died less because fewer were cold and fewer got infected, and the mother's chest did both, which makes this the most transferable finding in the newborn literature: the intervention is a person. A twenty-year follow-up of the Colombian trial found lasting social and behavioural differences (Charpak 2017).

Cold without a thermometer. Palpate the abdomen and both soles together with the back of the hand. Warm and warm is normal, 36.5 to 37.5 °C. Warm abdomen with cold feet is mild hypothermia, 36.0 to 36.4 °C. Cold abdomen with cold feet is moderate, below 36.0 °C (Malhotra 2021, reporting WHO guidance). Accuracy depends

on the observer: sensitivity 11 to 42 per cent with specificity 93 to 100 per cent in some reports, foot palpation in 250 Nepali newborns above 80 per cent sensitive but only 36 to 74 per cent specific. The pattern is consistent: **touch confirms cold well and rules it out badly.** Train it, repeat it, never trust a negative. Grade C. Hesperian's variant is to feel the back of the baby's neck while touching a healthy adult, and seek help if the baby does not warm in 1 to 2 hours (Hesperian 2026b).

Delayed bathing. Sixteen studies and 39,020 newborns gave low-certainty evidence that bathing at 24 hours may reduce mortality and hypothermia (Priyadarshi 2022), and Hesperian puts it plainly: a bath, even in warm water, makes a baby cold (Hesperian 2026b). No bath in the first 24 hours. Wipe.

4. The cord: when to cut, what to put on it, and what never to

When to cut. Across fifteen trials and 3,911 pairs, later clamping did not change severe postpartum haemorrhage or newborn death. It raised birthweight by 101 g and haemoglobin at 24 to 48 hours by 1.49 g/dL, and early clamping more than doubled iron deficiency at three to six months, risk ratio 2.65 (1.04 to 6.73). Against that, later clamping raised phototherapy for jaundice, and the authors recommended it "provided access to phototherapy for jaundice is readily available" (McDonald 2013). Hesperian waits until the cord is thin, white and still, often about three minutes (MA-01, THRIVING library), and Helping Babies Breathe puts it at 1 to 3 minutes (Mashao 2024). The post-Fall judgement differs from the hospital one: the phototherapy caveat no longer holds because there is no phototherapy, while iron will be scarce. Wait at least one minute, aim for three, cut at once if the baby needs breathing. Grade A.

Chlorhexidine, and where it works. In Sarlahi, Nepal, 413 communities and 15,123 infants were cluster-randomised to 4.0 per cent chlorhexidine (delivered as 7.1 per cent digluconate), soap and water, or dry care. Chlorhexidine cut severe omphalitis by about 75 per cent, and among infants enrolled within 24 hours neonatal mortality fell 34 per cent, risk ratio 0.66 (0.46 to 0.95). Soap and water did nothing (Mullany 2006, Mullany 2006b). Three South Asian cluster trials pooled, 54,624 participants, gave a 23 per cent fall in all-cause neonatal mortality, risk ratio 0.77 (0.63 to 0.94) (Imdad 2013, via IN-01 and WO-14, THRIVING library, and Sinha 2015).

Then it failed twice. In Zambia neonatal mortality was 15.2 per 1,000 with chlorhexidine against 13.6 with dry care, and the authors concluded it "does not seem to provide clear benefits" where deliveries are mostly in facilities and mortality is below 30 per 1,000 (Semrau 2016). On Pemba, Tanzania, it was 10.5 against 11.7 per 1,000, not significant (Sazawal 2016, secondary summary only). WHO's recommendation is conditional exactly as the trials demand: daily 7.1 per cent chlorhexidine digluconate to the stump for the first week **for home births where neonatal mortality is 30 or more per 1,000**, clean dry care otherwise (WHO 2013).

That answers the brief's question. Chlorhexidine works where babies are born on the floor of a house, which is the post-Fall setting, and a village back above 30 per 1,000 is in the South Asian trial population, not the Zambian one. Grade A there, useless though not harmful elsewhere.

What must never go on the cord. Tetanus spores live in soil and dung and germinate in a wound without oxygen (WO-14, THRIVING library). In Karachi, applying any substance to the cord carried an adjusted matched odds ratio of 5.1 (2.7 to 9.7) for neonatal tetanus, population attributable risk 69 per cent (Raza 2004). In the North West Frontier Province the risk attached to ghee made at home from cow's milk (Traverso 1991), and in rural Bangladesh to multiple ties and coconut oil, while handwashing and a cleaned cutting tool were protective (Hlady 1992). Untreated neonatal tetanus approaches 100 per cent fatal and 53 to 62 per cent die even in hospital, while two doses of maternal toxoid cut those deaths by about 94 per cent (HY-10 and WO-14, THRIVING library). The village's whole newborn tetanus policy is three sentences: vaccinate the mother while vaccine lasts, boil the blade and the string, put nothing on the cord.

The cord traditions deserve their own reading. They hold that the stump is a wound where the child is still open to the world and should be sealed, with ash, ghee, oil, dung or turmeric. The sealing logic is sound and the materials catastrophic, because what comes through the stump is not spirit but *Clostridium tetani*. This is the clearest case in

the book of a tradition whose reasoning is intact and whose material must change, and the replacement that respects the reasoning is a covering of nothing, taught as a practice rather than an absence, or a drop of chlorhexidine as the sealing substance.

Honey on the cord is listed in the brief as a botulism risk. Honey *eaten* under 12 months is an established cause of infant botulism and must never be given by mouth, but honey on a cord stump causing botulism I could not confirm in any case series [VERIFY, gap]. The cord is not the place to test it.

Omphalitis. Case-fatality as high as 13 per cent has been reported, and data on untreated infants are "surprisingly scant" (Stewart and Benitz 2016). In southern Nepal, among 23,246 assessed infants, redness extending onto the abdominal skin raised the odds of death by 46 per cent (Mullany 2009, abstract only). The threshold is the skin, not the stump: redness on the stump is watched, redness spreading onto the belly is treated as sepsis.

5. The first feed, and what must not come before it

Tradition. Discarding colostrum is widespread and old: early modern England, across North India, and in Ethiopia where 14.8 per cent of mothers in one zone discarded it as sour or hard to digest, replacing it with water, honey, formula or animal milk (TR-14, THRIVING library). The logic inside the tradition is that the first milk is stale, having sat in the breast, and that the child's first swallow should be auspicious. It is coherent, and it is wrong, and it kills. The argument tradition will accept is that the first milk is the child's first medicine, not stale food.

Record. In 10,947 Ghanaian infants, starting after the first day carried 2.4 times the risk of neonatal death and a prelacteal feed about four times, with 22 per cent of neonatal deaths estimated preventable by feeding in the first hour (Edmond 2006, via TR-14, THRIVING library, primary not read [VERIFY]). Pooling five studies and 136,047 infants, starting at 2 to 23 hours carried 1.33 times the risk and at 24 hours or later 2.19 times (1.73 to 2.77), and among infants exclusively breastfed throughout the late group still carried 1.85 times the risk (Smith 2017). These are cohorts, and a sick baby feeds late because it is sick, but the association survived restriction to exclusive breastfeeders. Grade B.

Inference and practice. Colostrum coats the gut with immunoglobulin, and early suckling triggers oxytocin, which contracts the womb, so the first feed is also a haemorrhage intervention (MA-02, THRIVING library). Prelacteal feeds put non-sterile fluid into a sterile gut before that coat arrives. Skin to skin at once, breast within the first hour, nothing else by mouth, and it needs no object at all. Volumes, supply, expression, wet-nursing and what to do when the mother dies are **MA-06**.

6. Infection: the seven signs and what can be given

Recognition. The Young Infants Clinical Signs Study Group enrolled 8,889 infants under two months, recorded 31 signs by a health worker and compared with a paediatrician's judgement of severe illness needing admission. A twelve-sign rule gave 87 per cent sensitivity and 74 per cent specificity in the first week, and cutting to seven barely changed it: 85 and 75 per cent at 0 to 6 days (Young Infants Clinical Signs Study Group 2008). The seven are difficulty feeding by history, convulsions by history, movement only when stimulated, respiratory rate 60 a minute or more, severe chest indrawing, temperature 37.5 °C or more, and temperature below 35.5 °C. Note what is absent: no laboratory, no culture, no white cell count. A watch and the back of a hand run the whole rule. Grade A.

What can be given when referral is impossible. AFRINEST randomised young infants in the Democratic Republic of the Congo, Kenya and Nigeria whose families could not accept referral. Against a reference of injected procaine benzylpenicillin plus gentamicin for 7 days, three simplified arms were all as effective, the key one being 2 days of gentamicin injection with 7 days of oral amoxicillin (AFRINEST 2015, abstract only, per-arm failure rates not read [VERIFY]). WHO built its 2015 guideline on these trials: where referral is not feasible, an infant of 0 to 59 days with signs of possible serious bacterial infection gets intramuscular gentamicin 5 to 7.5 mg/kg once daily (3 to 4 mg/kg if low birthweight) plus oral amoxicillin 50 mg/kg twice daily for 7 days, while one whose only sign is fast

breathing gets the amoxicillin alone (WHO 2015, read through secondary summaries of the tables). In a Pakistani programme where families refused referral, 720 of 781 were cured. Grade A. Hesperian's lay version uses ampicillin and weight bands, easier without a scale (Hesperian 2026c, doses in Protocol 4). IN-05 holds the salvage, expiry and stewardship rules and the gentamicin safety protocol.

What it is worth. Possible serious bacterial infection caused about 0.68 million neonatal deaths in 2012 (Seale 2014). In Gadchiroli, India, Bang trained village health workers in 39 villages against 47 controls to manage asphyxia, prematurity, hypothermia and feeding problems and treat suspected sepsis at home. Neonatal sepsis case fatality fell from 16.6 to 2.8 per cent, and neonatal mortality fell 62.2 per cent net of controls, at 5.3 US dollars per neonate (Bang 1999). It was controlled before-and-after, not randomised, and the effect is at the high end of plausibility, but it is the strongest demonstration in the record that trained lay people can treat newborn sepsis at home. Grade B. Community care packages across 26 studies cut neonatal mortality, risk ratio 0.87 (Lassi 2019). Oral antibiotics are salvage with an expiry, and when the last tin is gone the seven signs, the warmth and the breast still work.

7. Jaundice: the hand, the light and the danger

By hand. Kramer's 1969 observation was that visible yellowing moves head to foot through five dermal zones correlating with serum bilirubin, with a wide range inside each zone (Kramer 1969, via later reviews). That caveat is the story. A Bern comparison put visual assessment last, at about plus or minus 1.5 zones, but its usable conclusion was that bilirubin above 250 micromol/L can be ruled out by eye if the yellow has not reached the abdomen or limbs in a healthy term newborn. Validation elsewhere gave 83.8 per cent sensitivity and 73.5 per cent specificity at zone 3 in 300 Pakistani infants, with warnings for darkly pigmented babies. Grade C. The lay rule fits the evidence better than a numeric scale would: get help at once if the yellow starts on day one, lasts over two weeks, reaches hands or feet, or comes with a baby who is very sleepy, will not wake to feed, or will not stay warm (Hesperian 2026c).

Light. Slusher randomised 447 infants in Lagos between filtered sunlight and conventional phototherapy. Filtered sunlight was efficacious on 93 per cent of evaluable treatment days against 90, and no infant needed exchange transfusion, but temperature above 38.0 °C occurred in 5 per cent against 1 (Slusher 2015). The canopies used commercial window film passing about a third of blue light, 400 to 520 nm, while screening ultraviolet and infrared. Cochrane is colder: three small unblinded trials, 1,103 infants, high risk of bias, and the studies "have not demonstrated that sunlight alone is effective for the treatment of hyperbilirubinemia" (Horn 2021).

Here is the contradiction the book must not hide. Hesperian says to undress the baby, cover her eyes and put her in the sun 5 minutes once or twice a day, warning that longer burns (Hesperian 2026c). Slusher used a filter, supervision and temperature monitoring and still ran 5 per cent hyperthermia, and five minutes of unfiltered tropical sun will not cure significant jaundice and may burn a newborn. **Unfiltered sunlight is not phototherapy.** It is a weak measure for mild jaundice and a dangerous one as a substitute for recognising the severe case. The real treatment in a village is frequent feeding, because bilirubin leaves in the stool, and the real skill is spotting the baby beyond help. Grade D, trending X.

Severe disease. About 1.1 million babies a year develop severe hyperbilirubinaemia, sub-Saharan Africa and South Asia leading (Olusanya 2015, Olusanya 2014, abstracts only). Exchange transfusion cannot be done in a village, and attempting it without grouping, cross-matching and sterile catheters kills faster than the bilirubin. Kernicterus belongs on the red flag list, not the treatment list.

8. Eyes, vitamin K, and the two prophylaxes that may not survive

Eye prophylaxis. Carl Credé introduced silver nitrate drops at Leipzig in 1880 to 1881, and ophthalmia neonatorum at his clinic fell from 30 to 35 cases a year to one in the second half of 1880. Before prophylaxis, prevalence in European maternity hospitals exceeded 10 per cent of live births, and up to half the children in blind schools were there because of it (Schaller and Klauss 2001). The best controlled comparison is Isenberg's masked trial of 3,117 in-

fants at Kikuyu, Kenya, 1991 to 1993, comparing 1 per cent silver nitrate, 0.5 per cent erythromycin ointment and 2.5 per cent povidone-iodine. Povidone-iodine beat both, particularly against chlamydia, and without prophylaxis ophthalmia neonatorum occurred in as many as 23.2 per cent of newborns there (Isenberg 1995, secondary summaries only). Grade A where prevalence is high.

Silver nitrate is caustic, erythromycin is salvage, and a 2.5 per cent aqueous povidone-iodine solution is the one eye prophylaxis a dispensary might plausibly keep. Do not improvise with tincture of iodine or stronger povidone-iodine: the eye is not skin. Where nothing exists, treat maternal genital infection before birth and watch every newborn's eyes for pus in the first five days, which is treatable when caught.

Vitamin K. Without prophylaxis, late vitamin K deficiency bleeding has a median incidence of about 35 per 100,000 live births, 80 in low- and middle-income countries, and presents mostly as bleeding into the brain, in breastfed infants (Sankar 2016). Intramuscular or subcutaneous prophylaxis gives a pooled relative risk of 0.02 (0.00 to 0.10) against none, from four surveillance studies, low-quality observational evidence with no randomised trials. A single oral dose is far worse than intramuscular, relative risk 24.5 (7.4 to 81.0), while multiple oral doses are not clearly worse, 3.64 (0.82 to 16.3). Oral schedules are 2 mg at birth, at 4 to 6 days and at 4 to 6 weeks, or 2 mg at birth then 1 mg weekly for three months (Sankar 2016, Canadian Paediatric Society n.d.).

This is the hardest honest answer here. Vitamin K cannot be made in a village, cannot be got from food in these quantities, and maternal supplementation is not a proven substitute [VERIFY]. When the salvaged ampoules run out, roughly one baby in a thousand to one in several thousand will bleed into its brain, mostly in weeks two to twelve, and most will die or be disabled. The village can only spend remaining stock on the highest-risk babies: the preterm, the traumatically born, those whose mothers took anticonvulsants, and those jaundiced beyond two weeks. Grade B for intramuscular, X for a single oral dose as a substitute.

9. The small or early baby at home

Under 2.5 kg is low birthweight, under 1.5 kg very low. Hesperian teaches estimating by lifting, after handling many babies, for attendants with no scale, and lists the consequences: higher risk of infection, breathing problems and jaundice, trouble feeding, and the smaller the baby the greater the risk. The care is kangaroo mother care without the name: the baby naked but for nappy and hat inside the mother's clothing, day and night, with another family member relieving her, and where it cannot suckle, hand-expressed milk by very clean cup or spoon, with daily visits for weeks (Hesperian 2026b). The iKMC trial says this is worth a quarter of the deaths at 1.0 to 1.8 kg (WHO Immediate KMC Study Group 2021).

How much milk. An Indian national adaptation of WHO guidance gives a daily fluid requirement rising from 60 mL/kg on day 1 to about 160 mL/kg by day 7, divided into three-hourly feeds, or two-hourly under 1.5 kg (NHSRC India n.d., adapting WHO 2011). Protocol 6 carries the per-feed volumes. WHO's 2022 update allows increments to 30 mL/kg/day for tube- or cup-fed preterm infants, conditional, moderate certainty (WHO 2022, secondary summary). Babies under about 1,200 g or unable to feed orally need intravenous fluids, which a village cannot give. Grade B for cup and spoon feeding.

What cannot be done. Antenatal corticosteroids, surfactant, continuous positive airway pressure and incubators are gone. A baby under about 32 weeks or 1.5 kg at home will usually die, and the chapter should say so rather than offer a protocol implying otherwise. Between about 1.8 and 2.5 kg, warmth and milk alone give a real chance, and that is the band where the village's work pays.

10. Tradition on its own terms

Birth traditions are not a list of errors. On their own logic most are attempts at three things the evidence also cares about: keeping the baby warm, keeping mother and baby together, and marking the cord as the join between the

child and the world. The carrying traditions hold that a baby separated from its mother will not thrive and that its spirit is not yet settled, and the record says the same in other words: a quarter fewer deaths among small babies.

Restricted knowledge exists here and SY-04's rule applies: say that it exists, name its custodians where the published record does, reproduce none of it (SY-04, THRIVING library). Yolŋu *djäkamirr*, caretakers of birth at Galiwin'ku in north-east Arnhem Land, are trained on a curriculum the published work deliberately does not set out, and Guatemalan comadronas describe their knowledge and ritual as sacred (TR-14, THRIVING library). Nothing here reaches that content.

Evidence grades

Practice	Tradition says	Record shows	Grade
Dry and stimulate at birth	Rubbing wakes it	Stimulation 47 to 88 per cent, day-1 deaths down 47 per cent (Msemo 2013)	B
Ventilation within the Golden Minute	Not traditional	Day-1 death RR 0.53, fresh stillbirth RR 0.76 (Msemo 2013)	B
Room air not oxygen	Not traditional	Mortality OR 0.57 against pure oxygen (Saugstad 2005)	A
Mouth-to-mouth-and-nose puffs	Blowing into the face	No trial, mouth-to-mask non-inferior in one pilot (Massawe 1996)	C
Stopping at about 20 minutes	Varies	Of 277, 69 per cent died, 11 per cent intact (ILCOR 2020)	B
Immediate continuous skin to skin	Carrying traditions	28-day death RR 0.75, less hypothermia and sepsis (WHO iKMC 2021)	A
Hypothermia by touch	Universal	Specificity 93 to 100, sensitivity 11 to 42 untrained (Malhotra 2021)	C
Cord clamping at 1 to 3 minutes	Wait for it to stop	Plus 101 g, iron deficiency RR 2.65 if early (McDonald 2013)	A
Clean blade, boiled tie, nothing on it	Seal the stump	Any substance, tetanus OR 5.1, PAR 69 per cent (Raza 2004)	A
Chlorhexidine 7.1 per cent on the stump	Not traditional	RR 0.77 in South Asia (Imdad 2013), null in Zambia and Pemba	A where NMR above 30
Ash, dung, ghee, oil on the stump	Sealing, auspice	Tetanus risk, untreated fatality near 100 per cent	X
Breast within the first hour	Varies	Death RR 1.33 at 2 to 23 h, 2.19 at 24 h or more (Smith 2017)	B

Practice	Tradition says	Record shows	Grade
Prelacteal feeds, discarding colostrum	First milk is stale	About four times the risk of neonatal death (Edmond 2006)	X
Seven danger signs	Not traditional	Sensitivity 85, specificity 75 per cent, days 0 to 6 (YICSSG 2008)	A
Simplified outpatient antibiotics	Not traditional	Equal to the 7-day injectable reference (AFRINEST 2015)	A
Village worker sepsis care at home	Not traditional	Sepsis fatality 16.6 to 2.8 per cent (Bang 1999)	B
Sunlight for jaundice	Sun dries the yellow	Filtered, efficacious on 93 against 90 per cent of days (Slusher 2015), unfiltered unsupported and it burns (Horn 2021)	B filtered, D to X unfiltered
Povidone-iodine 2.5 per cent eye drops	Not traditional	Beat silver nitrate and erythromycin (Isenberg 1995)	A
Vitamin K, injected and oral	Not traditional	Late bleeding RR 0.02 against none, oral RR 24.5 against injection (Sankar 2016)	B, oral X

Means ledger

Rung	What it can do	What it changes
Hands and knowledge alone	Dry and rub, skin to skin, mouth-to-mouth puffs, delay the cord, breast in the first hour, nothing on the stump, touch test, count breaths, the seven signs, spoon feeding	Most of the achievable gain, on the Msemo, iKMC and Smith figures
Hearth (fire, water, cloth, knife)	Boil blade, ties and spoon 20 minutes, warm the room, cloth-wrapped hot water bottles, wash to the elbow	Makes clean practice reliable, closing the tetanus and omphalitis route
Garden and still (soap, scale, pressure cooker, forge)	Spring balance, forged or carved mask and tube, pressure cooker for instruments, soap, a sand timer	Turns weight bands into doses, lets a second person ventilate
Village dispensary (300 people, salvaged stock)	Bag and masks 0 and 1, chlorhexidine, amoxicillin and gentamicin with a 1 mL syringe and a second checker, vitamin K, eye prophylaxis, toxoid, a register	Adds the AFRINEST regimens, taking sepsis case fatality from 10 to 16 per cent towards 3 while stock lasts

Rung	What it can do	What it changes
District infirmary (3,000 people, nurse, lab bench)	Haemoglobin and blood film, intravenous routes, nasogastric tubes, a warm room, a supervised sunlight canopy, refrigeration	Catches what the village cannot and holds the cold chain
Hospital before the Fall	Incubator, surfactant, ventilator, cultures, phototherapy, exchange transfusion, corticosteroids, cooling	The preterm third, and most kernicterus and asphyxia deaths. None of it returns

The step that changes the outcome most is hands to hearth, not village to district. Between them lies the clean cut.

Harm test

Rescue breathing. A newborn lung holds tens of millilitres. Blowing from the chest rather than the cheeks ruptures alveoli and causes pneumothorax, unsurvivable in a village (Hesperian 2026a). Signs it is going wrong: the chest heaving rather than lifting, sudden deterioration after a strong breath, one side not moving. Then reposition and use smaller puffs. Routine suction is separately harmful, because deep pharyngeal suction causes vagal bradycardia and apnoea (Mashao 2024). The harm of prolonged resuscitation is not to the baby but to the mother bleeding unattended.

Kangaroo care. The documented risks are the baby sliding down inside the wrap and suffocating, or falling when an exhausted mother sleeps sitting up. Mitigate with a binder under the buttocks, the head turned to one side and visible, and a second adult watching at night. Hot water bottles burn, because newborn skin scalds at temperatures an adult finds merely hot and a cold baby does not withdraw, so wrap them in cloth and check every 15 minutes.

Chlorhexidine is for the cord stump, never the eyes and never by mouth. **Gentamicin** damages the kidney and the hearing nerve, and newborn dosing is unforgiving: underdosing fails, overdosing deafens. Draw from the 10 mg/mL strength into a 1 mL syringe, have a second person check, stop if the baby stops passing urine (IN-05, THRIVING library). **Ceftriaxone** must never be given to a jaundiced newborn, because it displaces bilirubin and precipitates kernicterus, and never mixed with calcium. A specific, lethal, easily made error.

Sunlight burns within minutes at some latitudes, and an undressed baby overheats or chills. Never for a baby already febrile, dehydrated or under 1.8 kg. Signs it is going wrong: reddening skin, limpness, a baby too hot to hold. Then shade and the breast.

Substances on the cord. Mechanism proved, cases abundant: home-made ghee in the North West Frontier Province (Traverso 1991), ash in seventeenth-century England (TR-14, THRIVING library), dung across South Asia and West Africa. The error is not a dose, it is a single application. **Honey** is never given by mouth under 12 months, because of infant botulism. Weighing by feel is imprecise and the weight-band doses depend on it, which makes a spring balance a high-value early object.

Red flags

Signs that the baby will probably die or be disabled without what the village cannot give, with what to do anyway.

1. **No heartbeat after 15 minutes of ventilation, or gasping without regular breathing after 20 minutes.** Stop. Give the baby to the mother and say plainly what happened.
2. **Severe asphyxia with seizures in the first 24 hours.** No cooling, no anticonvulsant in most villages. Keep warm, keep the airway clear, spoon-feed if the baby will swallow, expect death or disability.

3. **Birthweight under about 1.2 kg, or clearly under 30 weeks.** Skin to skin and expressed milk by spoon. Say honestly that most will not live, and do not take the baby away for procedures that cannot help.
4. **Yellow on day one, or reaching palms and soles, or a jaundiced baby who will not wake to feed or arches with a high-pitched cry.** Acute bilirubin encephalopathy. No exchange transfusion is possible. Feed every 2 hours and prepare the family.
5. **Stiffness, locked jaw, spasms triggered by touch, days 3 to 14, in a baby who fed well then stopped.** Neonatal tetanus, near 100 per cent fatal without ventilation. Dark quiet room, minimal handling, diazepam if any exists, milk between spasms (WO-14, THRIVING library).
6. **Bulging soft spot, stiff neck, head bent back, vomiting, unconsciousness.** Meningitis. Give whatever antibiotic exists and expect to lose most.
7. **Sudden pallor, bleeding from cord, nose, gut or skin after the first week, or a seizure in a well-fed breastfed baby of 2 to 12 weeks.** Vitamin K deficiency bleeding, usually intracranial. Any remaining stock is for this.
8. **No urine or stool in the first 24 hours, vomiting everything, or a belly that swells and goes tight.** Obstruction or a surgical problem. Nothing a village can do.
9. **Mother dead or without milk and no wet-nurse.** A feeding emergency belonging to MA-06, but the first 48 hours are managed with expressed milk from any lactating woman, by spoon, in the volumes in Protocol 6.

Honest comfort is part of the protocol, not a failure of it. Keep the baby with the mother, warm, held and clean. Do not take a dying baby away to a corner. Let the family name it, and record the death, date, weight and apparent cause.

The case against

The resuscitation numbers. Msemo was before-and-after across a country during general change, with no concurrent control, so the gain is probably well under 47 per cent, and the wider review found no effect at seven or 28 days. The strongest version of the criticism is that training shows first-day gains which evaporate, meaning babies rescued at birth die of something else in week two. If true, the resuscitation chapter is worth less than the warmth and feeding chapters.

Chlorhexidine. Two large African trials found nothing, and ZamCAT's authors suggested the clean-and-dry message given to both arms may itself have been the active ingredient (Semrau 2016). If so the real intervention was never the antiseptic, which for a post-Fall village is cheering, since the message is free and the antiseptic is not.

Breastfeeding timing. All observational. A baby feeds late because it is sick, small or born to a sick mother, and no adjustment fully removes that, so treat the 22 per cent attributable fraction, which rests on one Ghanaian cohort, as an upper bound. The seven signs have their own cost: 75 per cent specificity means treating one well baby in four, a stewardship problem with finite antibiotics (IN-05, THRIVING library), and a critic would require two signs rather than one, at the price of missing more.

The romance of kangaroo care. The iKMC trial was unblinded and run in tertiary hospitals with nursing support, so carrying a 25 per cent reduction to an unsupported mother at home is an inference, not a finding [VERIFY].

The romance of the herbal, and of the hospital. There is no plant in this report, and that is itself a finding: the newborn literature offers no botanical intervention above grade D. What saves newborns is a dry cloth, a warm chest, a clean blade, a breast and, while stock lasts, three drugs. Equally, no practice replaces an incubator for a 900 g baby, and saying "this baby will die and here is how to hold it" is a clinical act.

10-line summary

1. Newborns are about 47 per cent of under-five deaths, and prematurity, asphyxia and infection cause roughly three-quarters of them.

2. Helping Babies Breathe halved first-day deaths in Tanzania and cut fresh stillbirths by a quarter, and the gain came from drying and stimulating more babies, not from bagging more.
3. Resuscitation on room air beats 100 per cent oxygen, so having no cylinder costs nothing here.
4. Stop at about 20 minutes. Of 277 infants resuscitated past 10 minutes, 69 per cent died and 11 per cent survived intact.
5. Immediate continuous skin-to-skin contact cut 28-day deaths in 1.0 to 1.8 kg babies by 25 per cent, through less hypothermia and sepsis.
6. Wait at least a minute before cutting the cord, ideally three, and cut at once if the baby must be breathed for.
7. Nothing goes on the cord. Any applied substance carried an odds ratio of 5.1 for neonatal tetanus, 69 per cent of cases attributable.
8. Chlorhexidine 7.1 per cent works where neonatal mortality is above 30 per 1,000 and births are at home, and did nothing in Zambia or Pemba.
9. The breast within the first hour, nothing else by mouth. Starting after 24 hours carried 2.19 times the risk of neonatal death.
10. Seven signs find 85 per cent of severely ill young infants with no instrument, and oral amoxicillin with short gentamicin matches a week of injections.

Open questions

- Does the first-day benefit of resuscitation training persist, or do rescued babies die in week two? Unresolved.
- What is the treatment-failure rate in each AFRINEST arm? I could not read the primary paper and found the equivalence margins in no summary [VERIFY].
- Is honey on the cord stump a documented cause of infant botulism, or has the oral risk been transferred to the topical route by assumption? No case found [VERIFY, gap].
- Does maternal vitamin K supplementation protect enough to replace neonatal dosing? No adequate evidence either way [VERIFY].
- What was neonatal sepsis case fatality before antibiotics? No pre-1950 series surfaced. A genuine gap in this report.
- Does the touch test improve enough with training to be relied on? Sensitivity ranges from 11 to above 80 per cent across studies.

Sources to read in full

1. WHO Immediate KMC Study Group 2021, NEJM. The most important newborn trial for a world without machines.
2. Msemo 2013, Pediatrics, for its counter-intuitive fall in bag-mask use.
3. ILCOR 2020 CoSTR NLS 896, where the stopping decision is argued with numbers.
4. Young Infants Clinical Signs Study Group 2008, Lancet. The seven signs.
5. Hesperian, *A Book for Midwives*, 2026, chapters 13 to 15. The only major manual for a reader with nothing.
6. Mullany 2006, Lancet, beside Semrau 2016 and Sazawal 2016: why context decides whether an intervention works.
7. Bang 1999, Lancet. Village workers treating newborn sepsis at home.
8. McDonald 2013, Cochrane CD004074. Cord clamping, with the jaundice trade-off stated.
9. Slusher 2015, NEJM, with Horn 2021, Cochrane CD013277. Filtered sunlight and its limits.
10. WHO 2015 guideline on serious bacterial infection when referral is not feasible.

At the bedside after the Fall

A household. Needs two dry cloths, a hat, a boiled blade, two boiled strings, boiled water, soap, a one-minute timer, and one adult who has practised rescue breathing on a doll. First failure to expect: the baby is dried, put on the

chest, then taken off within ten minutes to be washed, weighed and admired, and goes cold. Cold is the commonest avoidable harm here, and well-meant handling causes it.

A village of 300. Expect 6 to 10 births a year. Needs one trained attendant and a trained second pair of hands at every birth, a spring balance and sling, a self-inflating bag with masks 0 and 1 or a locally made tube-and-mask, a pressure cooker, salvaged chlorhexidine, amoxicillin and gentamicin with a 1 mL syringe, vitamin K and eye prophylaxis for the highest-risk babies, maternal toxoid while the cold store holds, and a register. First failure to expect: the second pair of hands is not there, because the only trained person is busy with the mother's bleeding. Training that second person is the cheapest thing the village will ever do.

A district of 3,000. Expect 60 to 100 births and 3 to 8 newborn deaths a year even with good practice. Needs a nurse or experienced healer taking referrals, a warm room where a mother can stay skin to skin for days, pooled antibiotic stock with a written gate and expiry log, a cold box for toxoid, a filtered-sunlight canopy to Slusher's specification if the film can be salvaged, and a register aggregating the village ones. Its real product is audit: it is the only level that can see that a village's babies are dying of tetanus and find out why. First failure to expect: it spends itself on the very preterm babies it cannot save and neglects the audit that would save twenty others.

To start, everywhere. Plants: none. Materials: cloth, soap, string, a blade, fire, a timer, a balance. Skills: drying and stimulation, mouth-to-mouth puffs, the touch test, counting breaths, the seven signs, hand expression, spoon feeding, tying a kangaroo binder. Records: a birth register.

Protocols

Protocol 1. The first hour, with counts and timings

Before the birth - [ ] Room closed to draughts, aim 23 to 25 °C, warmer for a small baby (Mashao 2024). - [ ] Two dry warmed cloths, a hat, a boiled blade, two boiled strings, a clean firm flat surface within reach. - [ ] Hands washed to the elbow with soap and a nail brush for 60 seconds (HY-01, THRIVING library), and one named person whose only job is the baby.

0 to 30 seconds - [ ] Deliver onto the mother's abdomen. Dry the whole baby firmly, head and back included. **Remove the wet cloth.** Cover with the dry one, hat on. - [ ] Do not suction unless there was thick meconium. - [ ] Ask one question: is the baby breathing or crying?

If breathing, 30 seconds to 60 minutes - [ ] Skin to skin on the mother's bare chest, head turned to one side, covered, hat on. - [ ] Wait at least 60 seconds, ideally until the cord is thin, white and still, about 3 minutes. - [ ] Tie 2 finger-widths from the belly, second tie 3 finger-widths beyond, cut between with the boiled blade. Leave the end open, check for oozing. - [ ] Breast within the first hour. Nothing else by mouth: no water, no honey, no animal milk, no sugar water. - [ ] At 15, 30 and 60 minutes: count breaths for a full minute (normal 30 to 60) and run the touch test. - [ ] No bath for at least 24 hours. Wipe only.

If not breathing, or only gasping, at 30 seconds - [ ] Rub firmly up and down the back while the baby lies on the mother. Count to 10. - [ ] Still not breathing at 60 seconds: cut the cord now and move the baby to the firm warm surface, rolled cloth under the shoulders, head facing straight up, not tilted back. - [ ] Thick meconium only: suction mouth then nose, briefly. - [ ] Mouth over the baby's mouth and nose. **Cheek-sized puffs only.** Three to five slow breaths, then small puffs about 3 seconds apart, roughly 30 a minute. With a bag, 40 to 60. - [ ] Watch the chest. No rise: reposition the head, clear the mouth, check the seal, try again. - [ ] At 1 minute of good chest movement check the heart rate: count 6 seconds, add a nought. Under 100, keep ventilating and recheck every 3 minutes. - [ ] Stop when the baby cries or breathes at least 30 times a minute. Return skin to skin and watch for an hour. - [ ] **Stop resuscitation** if no heart rate has ever been found and 15 minutes have passed, or if the baby gasps without regular breathing after 20 minutes. Tell the family plainly. Give them the baby.

Protocol 2. The cord, days 0 to 10

- ☐ Nothing on the stump: not ash, dung, ghee, oil, turmeric, powder, honey or a hot compress.
- ☐ Leave it uncovered, with the nappy folded down below it.
- ☐ Wash hands before touching it. If soiled, rinse with clean water and let it dry. Do not scrub.
- ☐ Where chlorhexidine 7.1 per cent digluconate exists and the birth was at home: one application daily for 7 days, starting within 24 hours.
- ☐ Look daily. Redness on the stump alone: watch, look again in 6 hours. **Redness spreading onto the belly, pus, foul smell, or a baby off feeds: treat as sepsis** (Protocol 4).
- ☐ Expect separation between day 5 and day 15, with a few drops of blood. Bleeding more than that: re-tie closer to the belly.

Protocol 3. Warmth and the touch test

- ☐ Check at 15, 30 and 60 minutes, hourly for 6 hours, at every feed for the first day, then twice daily for a week.
- ☐ Back of the hand on the belly and both soles together. Warm and warm: normal. Warm belly, cold feet: mild, skin to skin now. Cold belly, cold feet: moderate, act at once.
- ☐ To warm: strip to nappy and hat, upright between the mother's bare breasts, binder tied under the buttocks, blanket over both.
- ☐ Offer the breast. A cold baby needs sugar as much as heat.
- ☐ Still cold after 30 minutes: cloth-wrapped hot water bottles beside, never against, the baby, checked every 15 minutes.
- ☐ Not warm after 1 to 2 hours, or cold with any of the seven signs: treat as sepsis.
- ☐ Never bath a baby who is not warm, and never in the first 24 hours.

Protocol 4. The seven signs and what to give

Check all seven at every visit in the first week, then daily to day 28. - [ ] Difficulty feeding, or stopped feeding after feeding well. - [ ] Convulsion, now or by history. - [ ] Moves only when stimulated. - [ ] 60 breaths a minute or more, counted a full minute while quiet. - [ ] Severe chest indrawing. - [ ] Temperature 37.5 °C or more, or feels hot. - [ ] Temperature below 35.5 °C, or will not warm.

Any one sign is a sick young infant.

- ☐ Fast breathing alone: oral amoxicillin 50 mg/kg twice daily for 7 days. Watch daily.
- ☐ Any other sign, where salvaged stock exists: intramuscular gentamicin once daily into the outer thigh, 5 to 7.5 mg/kg, or 3 to 4 mg/kg under 2 kg, for 2 days (up to 7), plus oral amoxicillin 50 mg/kg twice daily for 7 days.
- ☐ Draw gentamicin from the 10 mg/mL strength into a 1 mL syringe. **A second person checks weight, strength and volume before injection.** Stop if the baby stops passing urine (IN-05, THRIVING library).
- ☐ Where only ampicillin exists, by weight band: 2 kg or under, 100 mg twice daily. 3 kg, 150 mg three times daily. 4 kg or more, 200 mg three times daily, for 7 to 10 days, with gentamicin 6, 15 or 20 mg once daily by the same bands for 5 days (Hesperian 2026c).
- ☐ Never ceftriaxone in a jaundiced newborn, and never with calcium.
- ☐ Alongside the drug, always: skin to skin, milk by spoon every 2 hours, nothing by mouth if the baby cannot swallow. Review at 48 hours.
- ☐ With no antibiotic at all: warmth, milk, clean cord and IN-04's supportive measures (IN-04, THRIVING library). Expect roughly one in six to die rather than one in thirty.

Protocol 5. Jaundice

- ☐ Look every day for the first week, in daylight, not lamplight.

- ☐ Press the skin for 2 seconds and read the blanched patch: nose, chest, belly, thighs, palms and soles.
- ☐ Yellow no further than the belly, baby feeding and alert: feed every 2 hours including at night, nothing else.
- ☐ **Get help or prepare the family if:** yellow on day 1, yellow reaching palms or soles, yellow past 2 weeks, or a jaundiced baby who will not wake to feed, arches backwards, has a high-pitched cry, or will not stay warm.
- ☐ Filtered sunlight, dispensary only and supervised: baby undressed but for a nappy, eyes covered, under film blocking ultraviolet and infrared, checked every 15 minutes, breast hourly, out of the canopy above 38.0 °C or below 36.5 °C or if the skin reddens.
- ☐ Unfiltered sun is not treatment. If used at all: no more than 5 minutes, early or late in the day, eyes covered, an adult watching, never instead of the signs above.

Protocol 6. The small baby at home, under 2.5 kg

- ☐ Weigh if a balance exists, otherwise compare by lifting against babies you have handled.
- ☐ Under about 1.2 kg: comfort care. Say so.
- ☐ 1.2 to 2.5 kg: continuous kangaroo care day and night, with a named relay of adults so the mother can sleep lying on her side.
- ☐ Binder supporting the buttocks, head turned to one side and always visible, nothing over the face.
- ☐ Try the breast before every feed. If she cannot latch, hand-express and give by clean spoon or cup, 5 mL extra for spillage.
- ☐ Feeding by spoon: baby awake and semi-upright on the lap, the spoon tip resting on the lower lip and tipped to pour a little at a time, each mouthful swallowed before the next, never forced, stopping when the baby closes her mouth.
- ☐ Volumes per feed, every 3 hours, or every 2 hours under 1.5 kg. 1.0 to 1.5 kg: 6, 7, 8, 9, 11, 13, 16 mL on days 1 to 7. 1.5 to 2.0 kg: 12, 16, 20, 24, 28, 32, 35 mL. 2.0 to 2.5 kg: 17, 22, 27, 32, 37, 40, 42 mL.
- ☐ Boil the spoon 20 minutes before each feed. Weigh weekly: a baby not back to birthweight by day 14 is failing.
- ☐ Seven signs daily to day 28, touch test twice daily.
- ☐ Expect the first failure to be night-time cold between 02:00 and 05:00, when the relay sleeps.

Protocol 7. The register

One line per baby per day for seven days, then weekly to 28 days. Date and time of birth. Weight or size band. Breathing at 1 minute, yes or no. Resuscitation given, and for how long. Time of cord cutting and of the first breastfeed. Anything put on the cord, which should always read "nothing". Daily: temperature by touch, breaths a minute, seven signs, feeding, cord, colour. Date and apparent cause of any death. The register is the village's only instrument for finding out which of its practices are killing children.

Numbers to carry

Number	What it is	Source
1 minute	The Golden Minute. By then the baby is breathing or being ventilated	Mashao 2024
30 to 60	Normal breaths a minute. 60 or more is a danger sign	Hesperian 2026b, YICSSG 2008
120 to 160	Normal heartbeat a minute. Under 100 is slow	Hesperian 2026a, Mashao 2024
30 puffs by mouth, 40 to 60 by bag	Ventilation rate a minute	Hesperian 2026a, Mashao 2024
20 minutes	When to stop resuscitation. 15 if there was never a heartbeat	ILCOR 2020, Mashao 2024

Number	What it is	Source
36.5 to 37.5 °C	Normal. Under 35.5 or over 37.5 is a danger sign	Malhotra 2021, YICSSG 2008
25 per cent	Fall in 28-day deaths from immediate skin-to-skin at 1.0 to 1.8 kg	WHO iKMC 2021
5.1 and 69 per cent	Tetanus odds ratio from any substance on the cord, and the share attributable	Raza 2004
50 mg/kg twice daily, and 5 to 7.5 mg/kg once daily	Oral amoxicillin, and gentamicin, for a sick young infant, 7 days	WHO 2015
60 mL/kg day 1 rising to 160 by day 7	Feed volumes for a low birthweight baby	NHSRC India n.d.

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