Exam 5 Study Guide

This guide covers the newborn. First the healthy transition: how the lungs clear and the shunts close, how to score and examine a newborn, and how cold, low glucose and jaundice threaten the first days. Then the high-risk newborn: who counts as high risk, how resuscitation runs minute by minute, how to tell the breathing problems apart, and the one correct first action for each emergency and anomaly. The arithmetic is per kilogram throughout. Work one chapter at a time. Read the "what to know" paragraphs, study the tables, then try each worked case with the steps covered. Finish each chapter with its ten self-test items. The cram sheet at the end puts the numbers in one place.

WHAT THIS GUIDE COVERS

- Chapter 9 · lung fluid clearance and the first breath, surfactant, normal breathing and apnea, closure of the three shunts, delayed cord clamping, the obstetric emergencies the newborn inherits, the Golden Minute and resuscitation, the Apgar score, measurements and gestational age, vital signs, the head-to-toe exam and scalp swellings, safeguarding, reflexes, heat loss and brown fat, the cold-stress cascade, hypoglycemia thresholds and dextrose math, bilirubin and the 24-hour rule, phototherapy, prophylaxis and screens, weight-based dosing and 4-2-1, feeding and output, cord and circumcision care, safe sleep and car seats, red flags and delegation.
- Chapter 10 · gestational age and birth weight categories, the late preterm trap, SGA, LGA and growth restriction, birth events, resuscitation steps, MR SOPA, compressions and epinephrine routes, saturation targets, RDS, TTN, meconium aspiration and PPHN, apnea of prematurity and BPD, cold stress, hypoglycemia and glucose infusion rate, newborn fluids, antibiotic doses and the adult ceiling, NEC, bilirubin, phototherapy and exchange, hemolysis and polycythemia, early and late sepsis, birth injury and safeguarding, therapeutic hypothermia, five anomalies and their first actions, Eat Sleep Console, delegation, immunizations and discharge.

CHAPTER 9

The Newborn: Transition, Assessment and Care

Read it in full: **Chapter 9 in the textbook**. Practice it in the lab: **Where the Heat Goes** and **The 24-Hour Rule**.

What to know

Before birth the lung is full of fluid, about 20 to 30 mL/kg. Labor hormones switch the alveolar cells from secreting chloride to absorbing sodium, and water follows sodium out. That is why a scheduled cesarean without labor raises the risk of transient tachypnea. The first breath needs opening pressures of 40 to 80 cm H2O. **Surfactant**, made from about 24 weeks and mature near 34 to 36 weeks, lowers surface tension and stops small alveoli from collapsing.

Normal newborn breathing is **30 to 60 a minute**, irregular and through the nose. Pauses up to 15 seconds without color or heart rate change are periodic breathing. A pause of 20 seconds or more, or any pause with cyanosis or bradycardia, is **apnea**.

At birth lung expansion drops pulmonary resistance, and cord clamping raises systemic resistance. The **foramen ovale** closes functionally within minutes to hours. The **ductus arteriosus** constricts as oxygen rises and placental prostaglandin falls, closing functionally by 12 to 24 hours and essentially by 72 hours. Hypoxia and acidosis can reopen the duct and send the baby back toward fetal circulation (PPHN). In duct-dependent heart lesions, the baby collapses as the duct closes, usually at 24 hours to 2 weeks; prostaglandin E1 keeps it open, and apnea is the expected side effect. Delayed cord clamping (30 to 60 seconds) adds 20 to 30 mL/kg of blood.

At every birth ask: term? good tone? breathing or crying? Any no means the warmer for initial steps. If apneic, gasping or heart rate under 100, **start positive-pressure ventilation within 60 seconds**. If the rate does not rise, fix ventilation with MRSOPA. If under 60 after 30 seconds of effective ventilation, compressions at 3:1 (90 plus 30 a minute). Epinephrine 0.01 to 0.03 mg/kg IV of the 0.1 mg/mL concentration. Start term babies in 21 percent oxygen. **Naloxone is not a delivery-room drug**; ventilate.

The **Apgar** scores Appearance, Pulse, Grimace, Activity and Respiration 0 to 2 each at 1 and 5 minutes, and every 5 minutes to 20 if the 5-minute score is under 7. 7 to 10 is reassuring, 4 to 6 moderate difficulty, 0 to 3 severe depression. Pulse is the most important single component. The score **never delays resuscitation** and never predicts one baby's future.

Term measurements: weight 2500 to 4000 g, length 45 to 55 cm, head 32 to 38 cm, chest 2 to 3 cm less than the head. Weight loss up to 7 to 10 percent by day 3 to 5 is expected, regained by 10

to 14 days; over 7 percent means evaluate feeding. The New Ballard Score (best at 12 to 24 hours) estimates gestational age within about 2 weeks. **SGA** is below the 10th percentile, **LGA** above the 90th; both are hypoglycemia risks. Vitals: heart rate 100 to 205 awake (typically 110 to 160), RR 30 to 60, systolic 60 to 90, axillary 36.5 to 37.5 °C. Count heart and breathing for a full minute.

Three scalp swellings: **caput** is edema, present at birth, soft, crosses sutures, gone in 3 to 5 days. **Cephalhematoma** is subperiosteal blood, appears hours later, firm, does not cross sutures, adds bilirubin. **Subgaleal hemorrhage** crosses sutures, spreads, follows vacuum birth and can cause shock; measure head circumference every 15 to 30 minutes and escalate for a rise over 1 cm. Check the red reflex, count cord vessels, feel femoral pulses. Congenital dermal melanocytosis is normal; document it. A true bruise in a non-mobile infant is a red flag, and the nurse reports on **reasonable suspicion**.

Heat leaves by **evaporation** (dry at once), **conduction** (warm surfaces), **convection** (no drafts) and **radiation** (away from cold walls and windows). Newborns cannot shiver; they burn **brown fat**. The **cold-stress cascade**: norepinephrine burns brown fat (more oxygen and glucose used, so hypoglycemia) and constricts lung vessels (hypoxia, anaerobic metabolism, acidosis), which impairs surfactant and reopens the shunts; fatty acids displace bilirubin from albumin. Rewarm about 0.5 °C per hour. Place the servo probe on the abdomen over the liver. A rectal 38.0 °C or more under 3 months is an emergency.

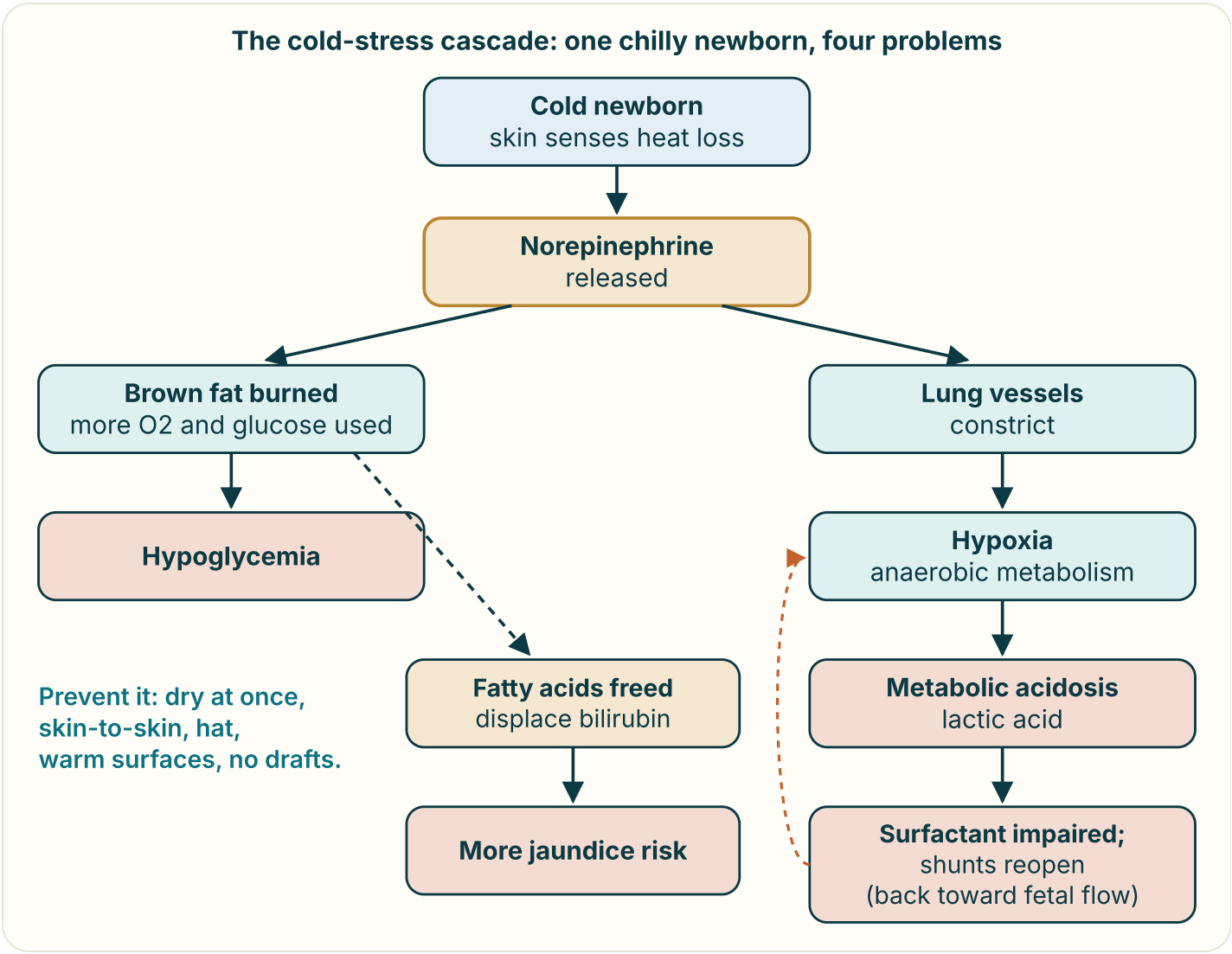
Glucose bottoms out at 1 to 2 hours of life. Screen at-risk babies: parent with diabetes, LGA, SGA, preterm or late preterm, stressed, cold, septic. Jitteriness stops when you hold the limb; a seizure does not. Thresholds: first 4 hours, IV dextrose under 25 mg/dL (feed and recheck 25 to 40); 4 to 24 hours, IV under 35 (feed and recheck 35 to 45); any symptomatic infant under 40, treat now. Goal 45 mg/dL or more. **40 percent dextrose gel 0.5 mL/kg** buccally before a feed; **D10W 2 mL/kg** IV over 5 minutes, then an infusion at a GIR of 5 to 8 mg/kg/min. Never 25 or 50 percent dextrose.

Newborns make more bilirubin and conjugate it slowly; stool carries it out, so **feeding is the intervention**, not water. Jaundice shows at about 5 to 7 mg/dL, head to toe. **Jaundice in the first 24 hours is pathologic**: hemolysis until proven otherwise. Also pathologic: a rise over 0.2 mg/dL per hour (5 per day), or a direct bilirubin over 1 mg/dL or over 20 percent of total. Suboptimal-

intake jaundice (days 2 to 5) needs better feeding; breast-milk jaundice (from day 5 to 7) in a thriving baby needs nothing but continued feeding. Phototherapy: maximum skin, eye shields, more feeds, no lotions. Acute bilirubin encephalopathy progresses from lethargy to high-pitched cry and arching to seizures; kernicterus is permanent.

Prophylaxis: **vitamin K 1 mg IM** (0.5 mg under 1500 g) within 6 hours; erythromycin eye ointment within the first hour or two; hepatitis B vaccine within 24 hours, plus HBIG within 12 hours if the parent is HBsAg positive. Screens: metabolic heel stick after 24 hours of feeding, hearing, and CCHD pulse oximetry at 24 hours or later (pass: 95 percent or more in either limb and a difference of 3 or less; under 90 fails at once; 90 to 94 or a difference over 3 repeats in an hour). Every pediatric dose is per kilogram of measured weight and capped at the adult maximum. Maintenance fluids use **4-2-1**, but not in the first days of life (start 60 to 80 mL/kg/day).

Feed on cue, 8 to 12 times a day; crying is a late cue. Formula-fed newborns take 45 to 90 mL every 3 to 4 hours. Breastfed infants need vitamin D 400 IU daily. First void within 24 hours, first meconium within 24 to 48; six or more wet diapers by day 4 to 5. Cord falls off in 7 to 14 days; keep it dry. Yellow exudate after circumcision is normal healing. **Safe sleep**: supine, firm flat surface, nothing else in the crib, room-share without bed-sharing for at least 6 months. Car seat rear-facing as long as the seat allows, harness at or below the shoulders, chest clip at armpit level. Assistive personnel may weigh and record a temperature; the RN interprets it and acts.



Cold is a metabolic emergency. Making heat burns brown fat, oxygen and glucose, so a cold baby becomes hypoglycemic, hypoxic, acidotic and more jaundiced. Drying and warming are also the metabolic treatment.

LOCK THESE IN

- Ventilation within the first 60 seconds is the most effective resuscitation step.
- The duct closes functionally by 12 to 24 hours; hypoxia, acidosis and cold can reopen it.
- Apgar at 1 and 5 minutes describes; it never delays care.
- Caput crosses sutures and fades in days; cephalhematoma does not cross; subgaleal crosses, spreads and can cause shock.
- Cold stress leads to hypoglycemia, acidosis, reopened shunts and worse jaundice.
- Dextrose gel 0.5 mL/kg; D10W 2 mL/kg; GIR 5 to 8 mg/kg/min.
- Jaundice in the first 24 hours, a rise over 0.2 mg/dL per hour, or direct over 1 mg/dL is pathologic.
- CCHD pass: 95% or more and a difference of 3 or less.

Newborn hypoglycemia thresholds

Hour of life	Treat IV if	Feed and recheck in 1 h if
First 4 hours	Under 25 mg/dL after a feed, or symptomatic	25 to 40 mg/dL
4 to 24 hours	Under 35 mg/dL after a feed, or symptomatic	35 to 45 mg/dL
Any age, symptomatic	Under 40 mg/dL: treat now	Do not rely on oral feeding alone
Beyond 48 hours	Persistently under 50 to 60 mg/dL	Investigate hyperinsulinism

Physiologic versus pathologic jaundice

Feature	Physiologic	Pathologic
Onset	After 24 hours	Within the first 24 hours
Peak	Day 3 to 5 term; 5 to 7 preterm	Any time; often early and fast
Rate of rise	Under 0.2 mg/dL per hour	Over 0.2 mg/dL per hour or 5 per day
Type	Unconjugated	Direct over 1 mg/dL or over 20% of total
Duration	Resolves by 1 week (term)	Beyond 2 weeks in a term infant
Baby	Well, feeding, normal output	Pallor, poor feeding, pale stools, dark urine

Worked cases

WORKED CASE 1 · TREAT THE LOW GLUCOSE BY WEIGHT

A 3.6 kg infant of a parent with diabetes is jittery at 2 hours with a plasma glucose of 22 mg/dL.

STEP 1 · CLASSIFY

Under 25 mg/dL in the first 4 hours, and symptomatic: intravenous dextrose. Treat first, confirm with the lab second.

STEP 2 · BOLUS

D10W 2 mL/kg × 3.6 kg = **7.2 mL** IV over about 5 minutes.

STEP 3 · COMPARE THE GEL

For an asymptomatic low, gel 0.5 mL/kg × 3.6 kg = 1.8 mL buccally before a feed.

STEP 4 · FOLLOW

Start a continuous infusion so the glucose does not rebound, and recheck 30 minutes after the intervention.

WORKED CASE 2 · CHECK THE GLUCOSE INFUSION RATE

A 2.8 kg newborn is on D10W at 10 mL/h. Is the GIR in the 5 to 8 mg/kg/min target?

STEP 1 · WRITE THE FORMULA

GIR = (dextrose percent × rate in mL/h) ÷ (6 × weight in kg).

STEP 2 · PLUG IN

(10 × 10) ÷ (6 × 2.8) = 100 ÷ 16.8.

STEP 3 · SOLVE

= **about 6.0 mg/kg/min**.

STEP 4 · JUDGE

Inside 5 to 8. Keep checking glucose on schedule.

WORKED CASE 3 · IS THIS JAUNDICE PATHOLOGIC?

A term newborn had a bilirubin of 6.0 mg/dL at 24 hours and 10.8 mg/dL at 40 hours.

STEP 1 · FIND THE CHANGE

10.8 minus 6.0 = 4.8 mg/dL.

STEP 2 · FIND THE TIME

40 minus 24 = 16 hours.

STEP 3 · RATE

4.8 ÷ 16 = **0.3 mg/dL per hour**.

STEP 4 · JUDGE

Over 0.2 mg/dL per hour is pathologic. Escalate for type and Rh, direct Coombs, hematocrit and reticulocytes, and plot against the hour-specific nomogram.

WORKED CASE 4 · MAINTENANCE FLUID FOR AN 18 KG CHILD

Use the 4-2-1 rule, then cross-check with the daily rule.

STEP 1 · FIRST 10 KG

10 × 4 = 40 mL/h.

STEP 2 · NEXT 8 KG

8 × 2 = 16 mL/h.

STEP 3 · ADD

40 + 16 = **56 mL/h**.

STEP 4 · CROSS-CHECK

100-50-20 daily: 1000 + 400 = 1400 mL a day, ÷ 24 = 58.3 mL/h. The two agree closely.

TRAPS PEOPLE FALL INTO

- **Waiting for the 1-minute Apgar before ventilating.** The score describes; ventilation starts within 60 seconds if needed.
- **Giving naloxone to a depressed newborn.** Ventilate. Naloxone can cause seizures in a newborn of an opioid-dependent parent.
- **Calling a swelling that crosses sutures a cephalhematoma.** Cephalhematoma stops at the sutures; a spreading one after vacuum birth may be subgaleal.
- **Treating early jaundice with water.** Feeding moves bilirubin out in stool; water displaces milk and risks hyponatremia.
- **Shrugging off jaundice at 18 hours.** Jaundice in the first 24 hours is pathologic until proven otherwise.
- **Using 4-2-1 on day one of life.** Newborns start at 60 to 80 mL/kg/day.

Chapter 9 self-test · ten items

1. A newborn pauses breathing for 10 seconds with no color or heart rate change. What is this?

A. Apnea of the newborn
B. Respiratory distress
C. Periodic breathing
D. Transient tachypnea

C. Periodic breathing Pauses up to 15 seconds without change are normal periodic breathing.

2. Which change helps close the ductus arteriosus after birth?

A. Falling oxygen and rising prostaglandin
B. Closure of the ductus venosus first
C. Rising right atrial pressure at birth
D. Rising oxygen and falling prostaglandin

D. Rising oxygen and falling prostaglandin Oxygen constricts ductal muscle and the placental prostaglandin supply disappears.

3. At 30 seconds a newborn is apneic with a heart rate of 80. What is next?

A. Begin positive-pressure ventilation
B. Give naloxone IM for the apnea
C. Assign the 1-minute Apgar first
D. Start chest compressions at 3:1

A. Begin positive-pressure ventilation Apnea or a rate under 100 calls for PPV within the Golden Minute.

4. A newborn has a heart rate of 110, weak irregular breathing, some flexion, a grimace, and blue hands and feet. What is the Apgar?

A. 5
B. 6
C. 8
D. 7

B. 6 Pulse 2, respiration 1, tone 1, grimace 1, color 1.

5. A swelling on the newborn scalp appeared at 6 hours, is firm and stops at the suture line. What is it?

A. Subgaleal hemorrhage
B. Caput succedaneum
C. Normal moulding
D. Cephalhematoma

D. Cephalhematoma Subperiosteal blood is bound at the sutures and appears hours after birth.

6. Which nursing action prevents heat loss by conduction?

A. Prewarm the scale and mattress
B. Close the door to the room
C. Dry the baby thoroughly at once
D. Move the cot away from the window

A. Prewarm the scale and mattress Conduction is loss to cold surfaces in contact with the skin.

7. A 3 kg newborn needs dextrose gel 40%. What volume is given?

A. 6 mL
B. 0.5 mL
C. 1.5 mL
D. 3 mL

C. 1.5 mL 0.5 mL/kg times 3 kg is 1.5 mL, given buccally before a feed.

8. Which jaundice finding is pathologic?

A. Total bilirubin of 11 on day 3
B. Visible jaundice at 18 hours of age
C. Jaundice peaking on day 4
D. Jaundice in a thriving baby on day 8

B. Visible jaundice at 18 hours of age Jaundice in the first 24 hours is hemolysis until proven otherwise.

9. CCHD screen: right hand 97%, foot 93%. What is the result?

A. Immediate fail; call for an echo
B. Pass, since the hand is over 95
C. Repeat the screen in one hour
D. Pass, since both are over 90

C. Repeat the screen in one hour A difference over 3 percent needs a repeat in an hour.

10. Which sleep setup matches safe sleep teaching?

A. Side-lying with a rolled towel behind
B. Supine in a bare crib in the parents' room
C. Prone on a firm mattress for reflux
D. Supine in the parents' bed between them

B. Supine in a bare crib in the parents' room Supine, on a firm flat surface with nothing else, room-sharing without bed-sharing.

CHAPTER 10

The High-Risk Newborn

Read it in full: **Chapter 10 in the textbook**. Practice it in the lab: **The Golden Minute: Walking the Resuscitation** and **Warmth, Sugar and Fluid: The Arithmetic Bench**.

What to know

Gestational age and birth weight are two different questions. **Preterm** is before 37 weeks: late preterm 34 0/7 to 36 6/7, moderate 32 0/7 to 33 6/7, very preterm under 32, extremely preterm under 28. Post-term is 42 0/7 or more. **Low birth weight** is under 2,500 g, very low under 1,500 g, extremely low under 1,000 g. The **late preterm** baby looks term but has an immature brain, liver, fat stores and suck, and is several times more likely to have hypoglycemia, jaundice, cold stress, apnea, poor feeding and readmission.

SGA (below the 10th percentile) is a size statement; **growth restriction** means failing one's own potential. **Symmetric** restriction begins early (chromosomes, congenital infection, alcohol). **Asymmetric** restriction spares the head and points to late placental insufficiency; these babies have used up glycogen and fat. **LGA** is often the infant of a parent with diabetes: fetal hyperinsulinemia continues after the cord is cut, so glucose can fall within 30 to 90 minutes. Screen both at about one hour, about 30 minutes after the first feed, then before feeds every 3 hours for 12 to 24 hours.

Birth emergencies shape the baby you receive: after magnesium toxicity, expect a floppy, hypoventilating newborn who needs ventilation, not naloxone; after cord prolapse or rupture, an acidotic baby; after shoulder dystocia, check for clavicle fracture and Erb palsy.

Prepare before every birth: gestational age, fluid clarity, number of babies, risk factors; warm the room to 23 to 25 °C. Three questions at birth; any no means initial steps. **PPV within the Golden Minute** at 40 to 60 breaths a minute if apneic, gasping or under 100. A rising heart rate is the best sign of effective ventilation. If not rising: **MR SOPA** (Mask, Reposition, Suction, Open mouth, Pressure, Alternative airway). Under 60 after 30 seconds of chest-moving ventilation: compressions at 3:1 with 100 percent oxygen. Still under 60 after 60 seconds: **epinephrine 0.02 mg/kg IV (0.2 mL/kg)**; the endotracheal dose is five times larger, 0.1 mg/kg (1 mL/kg). Volume is 10 mL/kg. No routine naloxone or bicarbonate.

Oxygen is a drug. Put the oximeter on the right hand (preductal). Start 21 percent at 35 weeks or more and 21 to 30 percent under 35 weeks. Targets: **1 minute 60 to 65, 2 minutes 65 to 70, 3 minutes 70 to 75, 4 minutes 75 to 80, 5 minutes 80 to 85, 10 minutes 85 to 95**. Hyperoxia feeds

retinopathy and lung injury. For meconium-stained fluid, routine tracheal suctioning is no longer recommended; ventilate if the baby is not breathing well.

Distress signs: rate over 60, flaring, retractions, grunting, cyanosis, apnea. **RDS** is surfactant deficiency in the preterm: ground-glass film with air bronchograms; CPAP 5 to 6 cm H2O and surfactant; antenatal betamethasone prevents it. **TTN** is retained lung fluid after cesarean without labor; resolves in 24 to 72 hours. **Meconium aspiration** in post-term or restricted babies: patchy infiltrates, air leak and PPHN risk. **PPHN**: labile hypoxemia with a preductal-postductal gap over 10 percent; minimal handling, inhaled nitric oxide, ECMO. Sudden collapse with asymmetric chest movement is a pneumothorax.

Apnea of prematurity is a pause over 20 seconds, or shorter with bradycardia or desaturation, under 37 weeks. **New apnea in a stable preterm is sepsis, NEC, IVH, hypoglycemia or seizure until excluded.** Caffeine citrate loads at 20 mg/kg. BPD is an oxygen need at 36 weeks postmenstrual age.

Cold stress: target axillary 36.5 to 37.5 °C; under 36.5 is cold stress, under 36.0 moderate hypothermia. Under 32 weeks, place the baby undried in a polyethylene wrap. Rewarm about 0.5 °C an hour. Hypoglycemia: minibolus D10W 2 mL/kg then an infusion; **GIR = (dextrose percent × mL/h) ÷ (kg × 6)**. Needing more than 8 to 10 mg/kg/min beyond 48 hours suggests hyperinsulinism. Newborn fluids start at 60 to 80 mL/kg/day; 4-2-1 applied to a 3.5 kg newborn gives 96 mL/kg/day, far too much on day one.

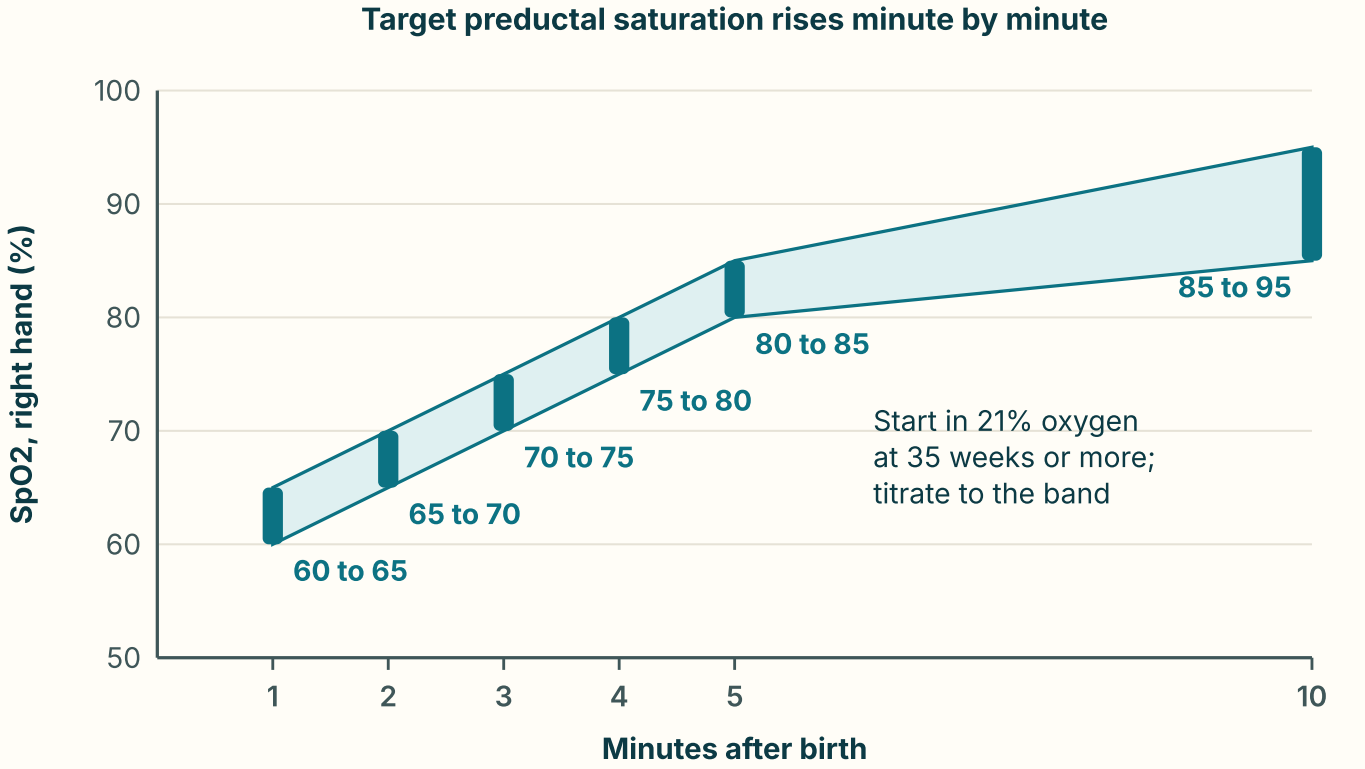
Every dose is per kilogram, checked by a second nurse for high-alert drugs, and **capped at the adult maximum**. Ampicillin for early-onset sepsis is 50 mg/kg per dose (100 for suspected meningitis); gentamicin 4 to 5 mg/kg with the interval set by postmenstrual age. Newborn volume expansion is 10 mL/kg slowly; beyond the newborn period the shock bolus is 20 mL/kg with reassessment after each.

Coordinated suck-swallow-breathe matures at 32 to 34 weeks; describe feeding behavior, never label a "poor feeder." Human milk protects against **NEC**. NEC appears in week 2 or 3 as residuals, distension, visible loops, bloody stool, apnea and temperature instability; pneumatosis

on film. **Stop feeds, orogastric tube to suction**, IV fluids, antibiotics, cultures, serial films and girths, surgery consult; no rectal temperatures.

Pathologic jaundice: first 24 hours, rise over 0.2 mg/dL per hour or 5 per day, direct over 1 mg/dL or 20 percent, or beyond 2 weeks (term). A high direct fraction suggests biliary atresia. Neurotoxicity risk factors (under 38 weeks, isoimmune disease, G6PD, sepsis, albumin under 3.0, instability) lower the treatment threshold. Exchange transfusion is about 160 mL/kg. Rh disease is prevented by RhIG; ABO incompatibility (group O parent, A or B baby) is milder and can affect a first pregnancy. Polycythemia is a hematocrit over 65 percent. **Early-onset sepsis** (first 72 hours: GBS, E. coli, Listeria) and **late-onset** (after 72 hours: line-related) both look like a baby who is "not right"; hypothermia is more common than fever. Blood culture, then antibiotics within the first hour.

Subgaleal hemorrhage can hold 20 to 40 percent of blood volume; measure head circumference hourly. Erb palsy: arm adducted and internally rotated, absent Moro on that side, grasp intact. Injuries must fit the history and the developmental stage; report on **reasonable suspicion**. **Therapeutic hypothermia**: 36 weeks or more, about 1,800 g or more, acidosis and moderate or severe encephalopathy; cool to 33.5 °C within 6 hours for 72 hours; heart rate 80 to 100 is expected. Anomalies, one first action each: **CDH: intubate, never bag-mask**; TEF: nil by mouth, upper-pouch suction, head up; myelomeningocele: prone, moist sterile dressing, latex-free; gastroschisis: bowel bag and 2 to 3 times maintenance fluid; ductal lesion: prostaglandin E1 with intubation ready. Withdrawal: use person-first language; **Eat, Sleep, Console** (eat an ounce, sleep an hour, console within ten minutes) with non-drug care first. Hypotension in a newborn is a pre-arrest sign. Preterm infants are vaccinated on the calendar; milestones use corrected age.



A corridor, not a ceiling. Healthy newborns start near 60 percent and climb over ten minutes. Titrate oxygen to the band on the right hand; too much oxygen harms preterm eyes and lungs.

LOCK THESE IN

- Late preterm 34 0/7 to 36 6/7: treat as a surveillance patient.
- Golden Minute: PPV within 60 seconds; fix it with MR SOPA before compressions.
- Compressions 3:1 if under 60 after 30 seconds of effective ventilation; epinephrine 0.02 mg/kg IV.
- Preductal targets: 60 to 65 at 1 minute up to 85 to 95 at 10.
- PPHN: pre to post gap over 10%; handle minimally.
- GIR = dextrose % times mL/h, divided by kg times 6; target 5 to 8.
- NEC: stop feeds and decompress. CDH: intubate, never bag-mask.
- Cooling to 33.5 °C within 6 hours, for 72 hours.

Respiratory syndromes of the newborn

Condition	Typical newborn	Radiograph	Core management
RDS	Preterm; worse with diabetes or asphyxia	Ground glass, air bronchograms, low volume	CPAP 5 to 6, surfactant, wean oxygen
TTN	Term or late preterm, cesarean without labor	Fluid in fissures, perihilar streaks	Warmth, oxygen if needed; 24 to 72 h
Meconium aspiration	Post-term or growth restricted	Patchy infiltrates, hyperinflation	Ventilation; watch air leak and PPHN
PPHN	Term, after asphyxia, MAS or sepsis	Often clearer than the hypoxemia	Oxygen, gentle ventilation, iNO, ECMO

Anomalies and the one first action

Anomaly	Clue	First action	Never
Diaphragmatic hernia	Scaphoid abdomen, bowel sounds in chest	Intubate; OG tube to suction	Bag-mask ventilation
Esophageal atresia with TEF	Frothy secretions, tube will not pass	Nil by mouth, pouch suction, head up	Feed the drooling baby
Myelomeningocele	Open sac on the back	Prone, sterile moist saline dressing, latex-free	Lie the baby on the sac
Gastroschisis	Exposed bowel	Bowel bag, side-lying, 2 to 3 times maintenance	Dry gauze wrap
Ductal-dependent lesion	Gray, mottled as the duct closes	Prostaglandin E1; ready to intubate	Withhold for fear of apnea

Worked cases

WORKED CASE 1 · TWO ROUTES, TWO EPINEPHRINE DOSES

A 2.5 kg newborn still has a heart rate under 60 after 60 seconds of compressions with ventilation. The 0.1 mg/mL concentration is used.

STEP 1 · IV DOSE

0.02 mg/kg × 2.5 kg = **0.05 mg**.

STEP 2 · IV VOLUME

0.05 mg ÷ 0.1 mg/mL = **0.5 mL** by umbilical venous catheter.

STEP 3 · ENDOTRACHEAL DOSE

Only while access is obtained: 0.1 mg/kg × 2.5 kg = 0.25 mg, which is 2.5 mL.

STEP 4 · CHECK

Say both numbers aloud with a second nurse; the routes are never interchangeable.

WORKED CASE 2 · ANTIBIOTICS FOR SUSPECTED EARLY-ONSET SEPSIS

A 2.8 kg term newborn has temperature instability and poor feeding at 30 hours. Ampicillin 50 mg/kg and gentamicin 4 mg/kg are ordered.

STEP 1 · AMPICILLIN

50 mg/kg × 2.8 kg = **140 mg** per dose.

STEP 2 · GENTAMICIN

4 mg/kg × 2.8 kg = **11.2 mg** per dose; at term, commonly every 24 hours.

STEP 3 · SEQUENCE

Blood culture first, but antibiotics start within the first hour of suspicion.

STEP 4 · MONITOR

Trough before the next dose if therapy goes past 48 hours; watch kidney function and hearing.

WORKED CASE 3 · WHY 4-2-1 FAILS ON DAY ONE

A 3.5 kg term newborn needs IV fluid on day one. A colleague suggests the 4-2-1 rule.

STEP 1 · APPLY 4-2-1

4 mL/kg/h × 3.5 kg = 14 mL/h.

STEP 2 · CONVERT TO A DAY

14 × 24 = 336 mL, which is 336 ÷ 3.5 = **96 mL/kg/day**.

STEP 3 · COMPARE

A term newborn starts at 60 to 80 mL/kg/day and advances 10 to 20 a day.

STEP 4 · CONCLUDE

4-2-1 overshoots on day one. Use the newborn mL/kg/day plan.

WORKED CASE 4 · IS THIS SATURATION ACCEPTABLE?

At 3 minutes of life a term newborn receiving PPV in 21 percent oxygen has a right-hand saturation of 72 percent and a rising heart rate.

STEP 1 · READ THE TARGET

At 3 minutes the preductal target is 70 to 75 percent.

STEP 2 · COMPARE

72 percent is inside the range.

STEP 3 · ACT

Do not raise the oxygen. Continue effective ventilation and keep titrating to the minute-by-minute target.

STEP 4 · WHY

Hyperoxia harms; a pink baby at 1 minute is not the goal.

TRAPS PEOPLE FALL INTO

- **Treating a 35-week baby as a well term baby.** Late preterm infants need glucose, temperature, feeding and bilirubin surveillance.
- **Starting compressions when the heart rate will not rise.** Fix the ventilation with MR SOPA first.
- **Pushing oxygen until the baby is pink at 1 minute.** Follow the minute-by-minute targets; hyperoxia harms.
- **Calling new apnea in a stable preterm "prematurity."** Rule out sepsis, NEC, IVH, hypoglycemia and seizure first.
- **Bag-mask ventilating a baby with a scaphoid abdomen.** Suspect CDH; intubate and decompress the stomach.
- **Medicating withdrawal first.** Optimize Eat, Sleep, Console care first.

Chapter 10 self-test · ten items

1. A newborn is born at 35 1/7 weeks. How is this baby classified?

A. Moderate preterm
B. Early term
C. Full term
D. Late preterm

D. Late preterm Late preterm is 34 0/7 to 36 6/7 weeks.

2. A wide-eyed, loose-skinned 39-week newborn has a normal head size but low weight. What pattern is this?

A. Asymmetric growth restriction
B. A late preterm infant
C. Symmetric growth restriction
D. Large for gestational age

A. Asymmetric growth restriction Head sparing points to late placental insufficiency.

3. During PPV the heart rate stays at 80 and the chest is not rising. What comes next?

A. Give a 10 mL/kg bolus
B. Start chest compressions
C. Run the MR SOPA steps
D. Give epinephrine IV

C. Run the MR SOPA steps Ineffective ventilation is corrected before compressions or drugs.

4. What is the preductal saturation target at 5 minutes of life?

A. 70 to 75 percent
B. 80 to 85 percent
C. 90 to 95 percent
D. 60 to 65 percent

B. 80 to 85 percent Targets climb gradually: 80 to 85 percent at 5 minutes.

5. A term newborn has hypoxemia with right hand 94% and foot 80%. What is suspected?

A. Persistent pulmonary hypertension
B. Normal transition in progress
C. Respiratory distress syndrome
D. Transient tachypnea of newborn

A. Persistent pulmonary hypertension A preductal-postductal gap over 10 percent shows right-to-left shunting.

6. A 3 kg newborn is on D10W at 9 mL/h. What is the GIR?

A. 7.5 mg/kg/min
B. 9 mg/kg/min
C. 5 mg/kg/min
D. 3 mg/kg/min

C. 5 mg/kg/min (10 times 9) divided by (3 times 6) is 90 divided by 18, which is 5.

7. A preterm infant on day 12 has bilious residuals and a rising girth. What is the first action?

A. Take a rectal temperature now
B. Stop feeds; OG tube to suction
C. Give a glycerin suppository first
D. Advance the feeds more slowly

B. Stop feeds; OG tube to suction Suspected NEC means nil by mouth and gastric decompression.

8. Which newborn meets one condition for therapeutic hypothermia?

A. Born at 34 weeks, weighing 1,600 g
B. Cooling can start at 9 hours
C. Apgar score of 8 at 10 minutes
D. Cord pH of 6.9 after cord prolapse

D. Cord pH of 6.9 after cord prolapse Perinatal acidosis such as a cord pH of 7.0 or less is one criterion; cooling must start within 6 hours.

9. A newborn has frothy secretions and the orogastric tube will not pass. What is the priority?

A. Lay the infant flat and supine
B. Nil by mouth, pouch suction, head up
C. Offer a small first feed slowly
D. Bag-mask ventilate with pressure

B. Nil by mouth, pouch suction, head up This suggests esophageal atresia with fistula; prevent aspiration.

10. Which question belongs to the Eat, Sleep, Console assessment?

A. Is the Finnegan score above 12 twice?
B. Did the parent use opioids during labor?
C. Can the baby be consoled within ten minutes?
D. Is the bilirubin above the threshold?

C. Can the baby be consoled within ten minutes? ESC asks whether the baby can eat, sleep an hour and be consoled within ten minutes.

ONE PAGE

Cram sheet

Everything from chapters 9 and 10 in one place. Cover the right column and see if you can rebuild each row.

Newborn numbers

Item	Value	Note
Respirations	30 to 60; apnea 20 s or more	Periodic pauses up to 15 s are normal
Heart rate	100 to 205 awake (110 to 160 typical)	Count a full minute
Temperature	36.5 to 37.5 °C axillary	38.0 rectal under 3 months = emergency
Weight loss	Up to 7 to 10%	Over 7% evaluate feeding
Glucose goal	45 mg/dL or more early	60 or more after 48 h
Gel and bolus	Gel 0.5 mL/kg; D10W 2 mL/kg	GIR 5 to 8
Vitamin K	1 mg IM within 6 h	0.5 mg under 1500 g
CCHD	95% or more, difference 3 or less	Under 90 = fail

High-risk rules

Item	Rule	Note
PPV	Within 60 s at 40 to 60 a minute	Rising heart rate = effective
Compressions	3:1, 120 events a minute	After 30 s of effective PPV under 60
Epinephrine	0.02 mg/kg IV; 0.1 mg/kg ET	0.1 mg/mL concentration
Volume	10 mL/kg newborn; 20 mL/kg older child	Reassess after each bolus
Saturation	60 to 65 at 1 min; 85 to 95 at 10 min	Right hand
Jaundice red flags	First 24 h; over 0.2/h; direct over 1	Not managed by eye
Sepsis	Culture, then antibiotics within 1 h	Ampicillin 50 mg/kg
Cooling	33.5 °C within 6 h for 72 h	36 weeks or more

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