Exam 7 Study Guide

This guide covers the sick child across body systems and the child in crisis. First the systemic and chronic conditions: dehydration and the gut, the kidney and the endocrine glands, blood, cancer and allergy, the brain, bones and skin, held together by weight-based arithmetic and partnership with the family. Then the emergencies: reading a child from the doorway, grading shock and dehydration, the fixed sequences for anaphylaxis, seizures, sepsis, ketoacidosis, poisoning and choking, recognizing injuries that do not fit, and staying with a family through bad news and loss. 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 sequences in one place.

WHAT THIS GUIDE COVERS

- Chapter 13 · why children destabilize faster, urine output and daily weight, vital signs and hypotension, grading dehydration and oral or IV rehydration, pyloric stenosis, intussusception, appendicitis, Hirschsprung disease, reflux, cleft lip and palate, celiac disease, UTI and reflux, nephrotic syndrome versus glomerulonephritis, DKA and cerebral edema, insulin and hypoglycemia, congenital hypothyroidism and CAH, sickle cell crises and prevention, hemophilia, ITP, iron deficiency, leukemia, febrile neutropenia and the ANC, tumor lysis, anaphylaxis, febrile seizures and status epilepticus, meningitis and ICP, shunts, neural tube defects, cerebral palsy, fractures and compartment syndrome, safeguarding, DDH, SCFE, scoliosis, Duchenne, eczema, safe-dose checks, CF care, pain tools and delegation.
- Chapter 14 · the Pediatric Assessment Triangle and TICLS, glucose in every abnormal appearance, vital signs by age, weight estimates, compensated and decompensated shock, CPR and defibrillation, SBAR, dehydration grading and deficit, 4-2-1 versus daily rules, boluses and their exceptions, ORS, the adult ceiling, anaphylaxis and auto-injectors, status epilepticus on the clock, septic shock, DKA and cerebral edema, poisoning and button batteries, choking, TEN-4-FACESp and sentinel injuries, injuries that raise concern, the duty to report and documentation, poverty versus neglect, family presence, SPIKES, perinatal loss, sudden unexpected infant death, children's grief and the team.

CHAPTER 13

Pediatric Systemic and Chronic Conditions

Read it in full: **Chapter 13 in the textbook**. Practice it in the lab: **Two Swollen Children and One Ketoacidosis: Sorting, Steroids and Sequence** and **Grading the Dehydrated Child: Findings, Volumes and the Obstructed Gut**.

What to know

A child has more water outside the cells, turns it over faster and cannot concentrate urine well until about age two, so dehydration comes quickly. Shock is compensated by heart rate and vasoconstriction; infant stroke volume is fixed, so **bradycardia is pre-arrest**. Blood pressure holds until 25 to 30 percent of volume is lost. Expected urine output: at least 2 mL/kg/h in an infant, 1 in a child, 0.5 to 1 in an adolescent; weigh diapers (1 g = 1 mL). **1 kg of acute weight loss is 1 liter of deficit.** Hypotension from 1 to 10 years is below 70 + (2 × age).

This chapter grades dehydration as **mild under 5 percent, moderate 5 to 10, severe over 10**, using percent = (pre-illness weight minus current) ÷ pre-illness × 100. Mild and moderate in a child who can drink get **ORS 50 or 100 mL/kg over 4 hours**, 5 mL every 1 to 2 minutes, plus 10 mL/kg per stool and 2 mL/kg per vomit; keep breastfeeding and restart the usual diet in 4 to 6 hours. No juice, sports drinks or plain water. Severe dehydration needs access (intraosseous after two attempts or 90 seconds) and a **20 mL/kg isotonic bolus**, reassessed each time, up to 40 to 60 mL/kg; 10 mL/kg in neonates, DKA, malnutrition and cardiac disease.

Pyloric stenosis (2 to 8 weeks): projectile non-bilious vomiting, a hungry infant, an olive mass, and hypochloremic hypokalemic metabolic alkalosis. Correct fluids and electrolytes **before** surgery. **Intussusception** (peak 5 to 10 months): sudden colicky pain with knees drawn up, a sausage mass; currant jelly stool is late. A normal brown stool before reduction must be reported. **Appendicitis**: sudden relief of pain means perforation; never heat or enemas. Hirschsprung enterocolitis (fever, explosive diarrhea, distension) is an emergency. Reflux: upright after feeds, but sleep stays supine. Cleft repair: no straws, pacifiers or spoons; elbow immobilizers. Celiac: no wheat, barley or rye.

Infant UTI is vague: fever, irritability, poor feeding. Use a catheter specimen in children not toilet trained. Teach front-to-back wiping, regular voiding and treating constipation. Fever in a child

with vesicoureteral reflux is not wait-and-see.

Nephrotic syndrome (2 to 6 years): massive proteinuria, albumin under 2.5, edema on waking, normal or low BP, no gross hematuria; prednisone 2 mg/kg/day (maximum 60 mg); infection and clots are risks. **Post-streptococcal glomerulonephritis** (5 to 12 years, after strep throat or impetigo): **cola-colored urine and hypertension**, low C3; supportive care with BP control and sodium and fluid restriction. For both, the **daily weight** is the best single measure.

DKA: glucose over 200 mg/dL, pH under 7.3 or bicarbonate under 18, plus ketones. **Fluids first**: 10 mL/kg isotonic bolus over the first hour, then an insulin infusion at 0.05 to 0.1 units/kg/h one to two hours later; **never an insulin bolus**. Potassium looks normal but the body is depleted; add it once under 5.5 and the child voids. Add dextrose when glucose reaches 250 to 300; drop no faster than 50 to 100 per hour. **Cerebral edema** appears 4 to 12 hours in: headache, rising BP with falling heart rate, vomiting, incontinence, falling consciousness; head up, mannitol or 3 percent saline, rapid response.

Rapid-acting insulin is given with food in hand. Long-acting insulin is never mixed; draw clear before cloudy. Hypoglycemia under 70 mg/dL in a conscious child: about 0.3 g/kg of fast carbohydrate, recheck in 15 minutes. Unconscious: glucagon IM 0.5 mg under 25 kg, 1 mg at 25 kg or more, then on the side. **Never omit insulin on sick days.** Congenital hypothyroidism: levothyroxine within two weeks, crushed in a small volume, never in a full bottle. CAH salt-wasting crisis in week 2 or 3; teach stress dosing.

Sickle cell disease shows after fetal hemoglobin falls (4 to 6 months), often as dactylitis. Pain crisis: scheduled analgesia, IV fluids at 1.5 times maintenance, warmth, **oxygen only if SpO2 under 95 percent**. **Acute chest syndrome** is the leading cause of death; **splenic sequestration** (enlarging spleen, falling hemoglobin, shock) is life-threatening; fever of 38.5 or more is an emergency. Penicillin prophylaxis from 2 months, vaccines, hydroxyurea; avoid meperidine. **Hemophilia A**: X-linked; joint bleeding shows as stiffness; no aspirin, NSAIDs, IM shots or rectal temps; after a head injury, **factor first, scan second**. ITP: protective care, worry about intracranial bleeding under 20,000. Iron deficiency peaks at 9 to 24 months: too much cow's milk; oral iron 3 to 6 mg/kg/day with vitamin C, through a straw; iron is a leading poisoning risk.

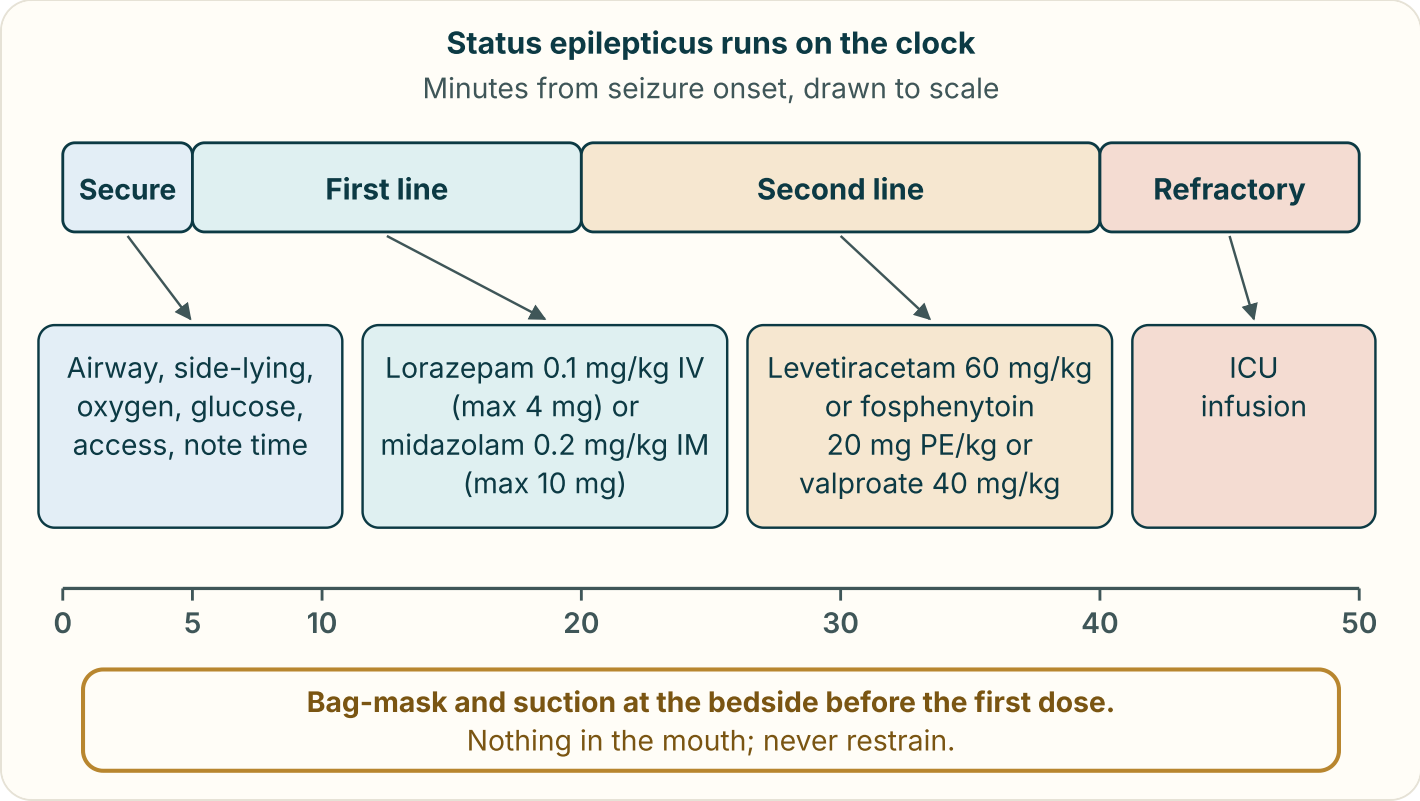
ALL peaks at 2 to 5 years: pallor, bruising, fever, bone pain. **ANC = WBC × (segs + bands percent) ÷ 100.** Fever of 38.3 once, or 38.0 for an hour, with ANC under 500 means **cultures and IV antibiotics within 60 minutes**. No rectal temperatures, live vaccines, fresh flowers or standing water. Tumor lysis raises potassium, phosphate and uric acid and lowers calcium; prevent with hydration and allopurinol or rasburicase. Fever is an emergency in neutropenia, sickle cell disease, a central line, high-dose steroids and infants under 3 months.

Anaphylaxis: IM epinephrine in the thigh first, 0.01 mg/kg of 1 mg/mL (maximum 0.3 mg child, 0.5 mg adolescent), repeated every 5 to 15 minutes. Antihistamines and steroids come after, never instead. Keep the child lying down; never let them stand or walk. **Febrile seizures** (6 months to 5 years, under 15 minutes, no recurrence in 24 hours) are usually benign; antipyretics do not prevent recurrence. During any seizure: time it, side-lying, protect the head, nothing in the mouth, no restraint. **Status epilepticus** is 5 minutes or more: lorazepam 0.1 mg/kg IV (max 4 mg) or midazolam 0.2 mg/kg IM (max 10 mg), then levetiracetam, fosphenytoin or valproate at 20 to 40 minutes, with bag-mask ready.

Neonatal meningitis is vague, with **paradoxical irritability**; older children have neck stiffness, Kernig and Brudzinski signs. Droplet precautions for 24 hours after antibiotics; antibiotics are not delayed for a lumbar puncture. Rising ICP in infants: bulging fontanelle, growing head, setting-sun eyes; in older children: morning headache and vomiting. The **Cushing triad** (hypertension with wide pulse pressure, bradycardia, irregular breathing) is late. Head up about 30 degrees, midline, space care out, quiet room. Myelomeningocele: prone, moist sterile dressing, latex-free, daily head circumference. Cerebral palsy is non-progressive; motor impairment is not intellectual impairment.

Children's bones bend (greenstick, buckle). The earliest sign of **compartment syndrome** is pain out of proportion that worsens with passive stretch; report, loosen the cast, and keep the limb **at heart level**, not above. Fractures in a non-walking child, posterior rib fractures, corner fractures and fractures of different ages need escalation; reporting is mandatory on reasonable suspicion. DDH: Pavlik harness 23 hours a day, parents never adjust straps. SCFE: strict non-weight-bearing. Duchenne: Gowers sign, high CK. Eczema: soak and seal within three minutes.

Every order is a calculation: weight in kg on admission, the safe range per kg, then the **adult maximum**. No trailing zeros; always a leading zero. Independent double checks for insulin, opioids, chemotherapy, anticoagulants, concentrated electrolytes and infusions. Maintenance by 4-2-1 with isotonic fluid; potassium only once voiding. CF enzymes with every meal and snack, not crushed, and never over 10,000 lipase units/kg/day. Pain tools: FLACC for under about 3 and non-verbal children, FACES from 3 to 7, numeric from 8; believe the score. Use descriptive, non-blaming words. The RN keeps assessment, teaching, evaluation and the unstable child.



The clock drives the drugs. A seizure still running at 5 minutes rarely stops on its own and gets harder to stop over time. Stabilize first, give a weight-based benzodiazepine at 5 minutes, and move to a second-line agent at 20.

LOCK THESE IN

- 1 kg of acute weight loss = 1 L of deficit.
- ORS 50 mL/kg (mild) or 100 mL/kg (moderate) over 4 hours; 20 mL/kg IV bolus for severe.
- Nephrotic: protein and edema, normal BP. Glomerulonephritis: cola urine and hypertension.
- DKA: fluids first, insulin infusion without a bolus; headache with bradycardia = cerebral edema.
- Sickle cell: oxygen only if hypoxic; acute chest and sequestration are emergencies.
- Febrile neutropenia (ANC under 500): cultures and antibiotics within 60 minutes.
- Status epilepticus at 5 minutes: weight-based benzodiazepine with airway ready.
- Compartment syndrome: pain on passive stretch; limb at heart level.

Nephrotic syndrome versus glomerulonephritis

Feature	Nephrotic (minimal change)	Post-streptococcal GN
Age	2 to 6 years	5 to 12 years
Trigger	Often none; may follow a virus	Strep throat 1 to 2 weeks or impetigo 3 to 6 weeks before
Urine	Massive protein, little blood	Cola or tea colored, mild protein
Blood pressure	Normal or low	High: the hallmark
Albumin	Low, under 2.5 g/dL	Normal or mildly low
Treatment	Prednisone 2 mg/kg/day, max 60 mg	BP control, sodium and fluid restriction
Watch for	Infection, clots, hypovolemia	Hypertensive encephalopathy, kidney injury

Status epilepticus on the clock

Time	Step	Drug
0 to 5 min	Stabilize	Airway, oxygen, monitor, glucose, access, note the time
5 to 20 min	First-line benzodiazepine	Lorazepam 0.1 mg/kg IV (max 4 mg) or midazolam 0.2 mg/kg IM (max 10 mg)
20 to 40 min	Second-line agent	Levetiracetam 60 mg/kg, fosphenytoin 20 mg PE/kg or valproate 40 mg/kg
Beyond 40 min	Refractory	Anesthetic infusion with intensive care

Worked cases

WORKED CASE 1 · IS THIS CHILD NEUTROPENIC?

A 4-year-old on chemotherapy has a temperature of 38.4 °C. WBC is 1,800/mm³ with 15 percent segs and 5 percent bands.

STEP 1 · ADD THE NEUTROPHILS

15 + 5 = 20 percent.

STEP 2 · CALCULATE

ANC = 1,800 × 20 ÷ 100 = **360/mm³**.

STEP 3 · CLASSIFY

Under 500 is severe neutropenia; a single temperature of 38.3 or more qualifies as febrile neutropenia.

STEP 4 · ACT

Blood cultures and the first broad-spectrum IV antibiotic within 60 minutes. No rectal temperature.

WORKED CASE 2 · CHECK AN ORDER AGAINST THE SAFE RANGE

Ibuprofen 300 mg is ordered for a 16 kg child. The safe range is 5 to 10 mg/kg per dose.

STEP 1 · CONVERT THE ORDER

300 ÷ 16 = **18.75 mg/kg** per dose.

STEP 2 · COMPARE

The upper limit is 10 mg/kg; this order is nearly double.

STEP 3 · FIND THE SAFE DOSE

10 × 16 = 160 mg would be the maximum per dose.

STEP 4 · ACT

Hold and clarify with the prescriber before giving anything.

WORKED CASE 3 · DKA IN A 24 KG CHILD: THE ORDER OF THINGS

A 24 kg child has glucose 540 mg/dL, pH 7.12 and ketones, with deep rapid breathing.

STEP 1 · FLUID FIRST

10 mL/kg × 24 kg = **240 mL** isotonic bolus over the first hour.

STEP 2 · INSULIN SECOND

One to two hours after fluids start: 0.1 units/kg/h × 24 = **2.4 units/h** by infusion. No bolus.

STEP 3 · POTASSIUM

Add once the level is under 5.5 and the child is voiding; it will fall as insulin works.

STEP 4 · WATCH THE BRAIN

Hourly neuro checks for 4 to 12 hours: headache with bradycardia and rising BP means cerebral edema.

WORKED CASE 4 · LORAZEPAM BY WEIGHT

An 18 kg child has been seizing for 6 minutes. IV access is in. Lorazepam 0.1 mg/kg (max 4 mg) is ordered; the vial is 2 mg/mL.

STEP 1 · CONFIRM

Five minutes or more is status epilepticus. Airway, oxygen and glucose are already done.

STEP 2 · DOSE

0.1 mg/kg × 18 kg = **1.8 mg**, under the 4 mg maximum.

STEP 3 · VOLUME

1.8 mg ÷ 2 mg/mL = **0.9 mL** IV.

STEP 4 · PREPARE

Bag-valve-mask and suction at the bedside; respiratory depression is expected. Note the time for the next step.

TRAPS PEOPLE FALL INTO

- **Giving juice or sports drinks for diarrhea.** Use oral rehydration solution; the others worsen diarrhea and lower sodium.
- **Rushing a pyloric stenosis infant to surgery.** Correct the alkalosis and potassium first.

- **Calling sudden relief of appendix pain improvement.** It suggests perforation.
- **Giving an insulin bolus in DKA.** Fluids first, then an infusion; no bolus.
- **Giving oxygen routinely in a sickle pain crisis.** Only if SpO2 is under 95 percent.
- **Elevating a limb with suspected compartment syndrome.** Keep it at heart level.

Chapter 13 self-test · ten items

1. A 10 kg toddler now weighs 9.4 kg after two days of diarrhea and can drink. What is the plan?

A. Nothing by mouth for 24 hours
B. Clear juice and sports drinks
C. An IV bolus of 20 mL/kg
D. ORS 100 mL/kg over 4 hours

D. ORS 100 mL/kg over 4 hours A 6 percent loss is moderate dehydration (5 to 10 percent); ORS 100 mL/kg in small sips.

2. A 4-week-old has projectile vomiting and labs show low chloride and potassium with alkalosis. What happens before surgery?

A. Immediate pyloromyotomy today
B. Start thickened formula feeds
C. Correct fluids and electrolytes
D. Give an antiemetic, then feed

C. Correct fluids and electrolytes Operating on an alkalotic, hypokalemic infant risks apnea after surgery.

3. A child scheduled for an enema reduction of intussusception passes a normal brown stool. What should the nurse do?

A. Proceed with the planned enema
B. Report it to the provider at once
C. Document it at the end of the shift
D. Give a laxative to clear the bowel

B. Report it to the provider at once A normal stool may mean the intussusception reduced and may change the plan.

4. A 7-year-old has cola-colored urine, periorbital edema and a BP of 138/90 two weeks after a sore throat. What is most likely?

A. Post-streptococcal glomerulonephritis
B. A simple urinary tract infection
C. Vesicoureteral reflux, grade V
D. Minimal change nephrotic syndrome

A. Post-streptococcal glomerulonephritis Gross hematuria with hypertension after strep points to glomerulonephritis.

5. Which order should the nurse question for a child in DKA?

A. An insulin infusion after fluids
B. Adding potassium once voiding
C. A 0.1 unit/kg IV insulin bolus
D. A 10 mL/kg isotonic bolus

C. A 0.1 unit/kg IV insulin bolus Children in DKA never receive an insulin bolus.

6. Two hours into DKA treatment a child has a headache, a heart rate falling from 140 to 84 and rising BP. What is suspected?

A. Cerebral edema
B. Normal improvement
C. Hypoglycemia
D. Hypokalemia

A. Cerebral edema Headache with bradycardia and hypertension during treatment is cerebral edema until proven otherwise.

7. A child with sickle cell disease has a fever, chest pain, cough and a new infiltrate. What is this?

A. Splenic sequestration
B. Acute chest syndrome
C. A simple pain crisis
D. Aplastic crisis

B. Acute chest syndrome A new infiltrate with fever and chest pain is acute chest syndrome, the leading cause of death.

8. A boy with hemophilia A falls and hits his head but looks well. What comes first?

A. A CT scan before any treatment
B. Observe for 4 hours at home
C. Ice and ibuprofen for the pain
D. Factor replacement before imaging

D. Factor replacement before imaging In hemophilia after a head injury, factor comes first and the scan second.

9. A child in anaphylaxis has hives, wheeze and a falling BP. What is the first drug?

A. Nebulized albuterol by mask
B. IM epinephrine, outer thigh
C. IV diphenhydramine push
D. Oral prednisolone syrup

B. IM epinephrine, outer thigh Epinephrine treats all the mechanisms; antihistamines and steroids are adjuncts after it.

10. A child in a long-leg cast has pain unrelieved by morphine that worsens when the toes are moved. What should the nurse do?

A. Report now; keep the leg at heart level
B. Apply ice packs all over the cast
C. Elevate the leg high on two pillows
D. Give another dose and recheck later

A. Report now; keep the leg at heart level Pain on passive stretch is the earliest sign of compartment syndrome; elevation above the heart lowers inflow.

CHAPTER 14

The Child in Crisis: Emergencies, Safeguarding and the Family

Read it in full: **Chapter 14 in the textbook**. Practice it in the lab: **When the Sequence Saves the Life: Ordering the Pediatric Emergency** and **Injuries That Do Not Fit the Story or the Stage**.

What to know

The **Pediatric Assessment Triangle** is a no-touch impression in under a minute: **appearance** (TICLS: Tone, Interactiveness, Consolability, Look or gaze, Speech or cry), **work of breathing** (stridor upper, wheeze lower, grunting alveolar; flaring, head bobbing, retractions, tripod or

sniffing position) and **circulation to skin** (pallor, mottling, then cyanosis, which is late). The pattern of abnormal legs names the state: breathing only is respiratory distress; appearance plus breathing is respiratory failure (bag-mask now); circulation only is compensated shock; appearance plus circulation is shock reaching the brain; all three is cardiopulmonary failure.

Check a glucose in every child with an abnormal appearance. Treat under about 47 mg/dL in a neonate or under 60 mg/dL in an infant or child, or any symptomatic child: dextrose 0.5 to 1 g/kg, in practice 5 to 10 mL/kg of 10 percent dextrose in an infant or 2 to 4 mL/kg of 25 percent in an older child.

Vital bands: neonate heart rate 100 to 205, infant 100 to 180, toddler 98 to 140, preschool 80 to 120, school-age 75 to 118, adolescent 60 to 100. Sleeping rates run 20 to 30 lower. Hypotension: under 60 neonate, under 70 infant, under 70 + (2 × age) from 1 to 10, under 90 at 11 and older. A rectal 38.0 °C in an infant under 28 days is an emergency. Weight estimate: (age × 2) + 8 for 1 to 5 years; (age × 3) + 7 for 6 to 12 years; a length tape is better.

Children compensate with tachycardia and vasoconstriction (delayed refill, cool mottled skin, narrow pulse pressure); once pressure falls, shock is **decompensated**. Most arrests are respiratory, so bag-mask ventilation saves most children. **Compress for a heart rate under 60 with poor perfusion** despite good ventilation: 100 to 120 a minute, one third of chest depth (about 4 cm infant, 5 cm child), 30:2 single rescuer, 15:2 two rescuers. Defibrillate 2 J/kg, then 4 J/kg, up to 10 J/kg or the adult dose. Epinephrine 0.01 mg/kg IV/IO (0.1 mL/kg of 0.1 mg/mL), maximum 1 mg. Escalate with SBAR; a parent saying the child is "not themselves" predicts deterioration.

Grade dehydration by percentage of weight lost: **mild under 5 percent, moderate 5 to 10, severe over 10**, and each 1 percent is 10 mL/kg. Weight change is the gold standard: 1 kg lost is 1 L. Deep sighing breaths are compensation for acidosis. Turgor misleads in chubby infants and hypernatremia.

4-2-1 gives the hourly rate; the daily 100-50-20 rule is a sanity check. They are furthest apart at 20 kg (60 versus 62.5 mL/h) and meet at **35 kg (75 mL/h)**. Use one consistently. A shock bolus is **20 mL/kg** over 5 to 20 minutes with reassessment; use 10 mL/kg for neonates, DKA, severe malnutrition, cardiac failure and raised ICP. A frankly hypotensive child beyond the newborn

period still gets 20 mL/kg rapidly, except neonates, cardiac disease and malnutrition. Over 40 to 60 mL/kg means vasoactive support. ORS over 4 hours: 50 mL/kg for mild, 100 mL/kg for moderate, plus 10 mL/kg per extra stool.

Weigh in kilograms only; pounds give a 2.2-fold overdose. Show the arithmetic and **check the adult ceiling**, per dose and per day. Write 0.5 mg, never .5 mg; 1 mg, never 1.0 mg. Know the 1 mg/mL and 0.1 mg/mL epinephrine strengths apart. A true independent double check means the second nurse calculates without seeing your work.

Anaphylaxis: skin signs plus breathing or circulation trouble, or two systems after a likely allergen; persistent vomiting can be a cardinal sign and up to one in five children has no rash. **IM epinephrine 0.01 mg/kg of 1 mg/mL into the anterolateral thigh first**, maximum 0.5 mg at any age (0.3 mg the usual ceiling in small children), repeat in 5 to 15 minutes. Auto-injectors: 0.1 mg (about 7.5 to under 15 kg, where available), 0.15 mg (15 to under 25 kg), 0.3 mg (25 to under 50 kg), 0.5 mg (about 50 kg and over). Lie flat with legs up if circulation fails; **never sit or stand a hypotensive child up**. Oxygen, 20 mL/kg bolus, albuterol for persistent wheeze. Antihistamines and steroids never come first.

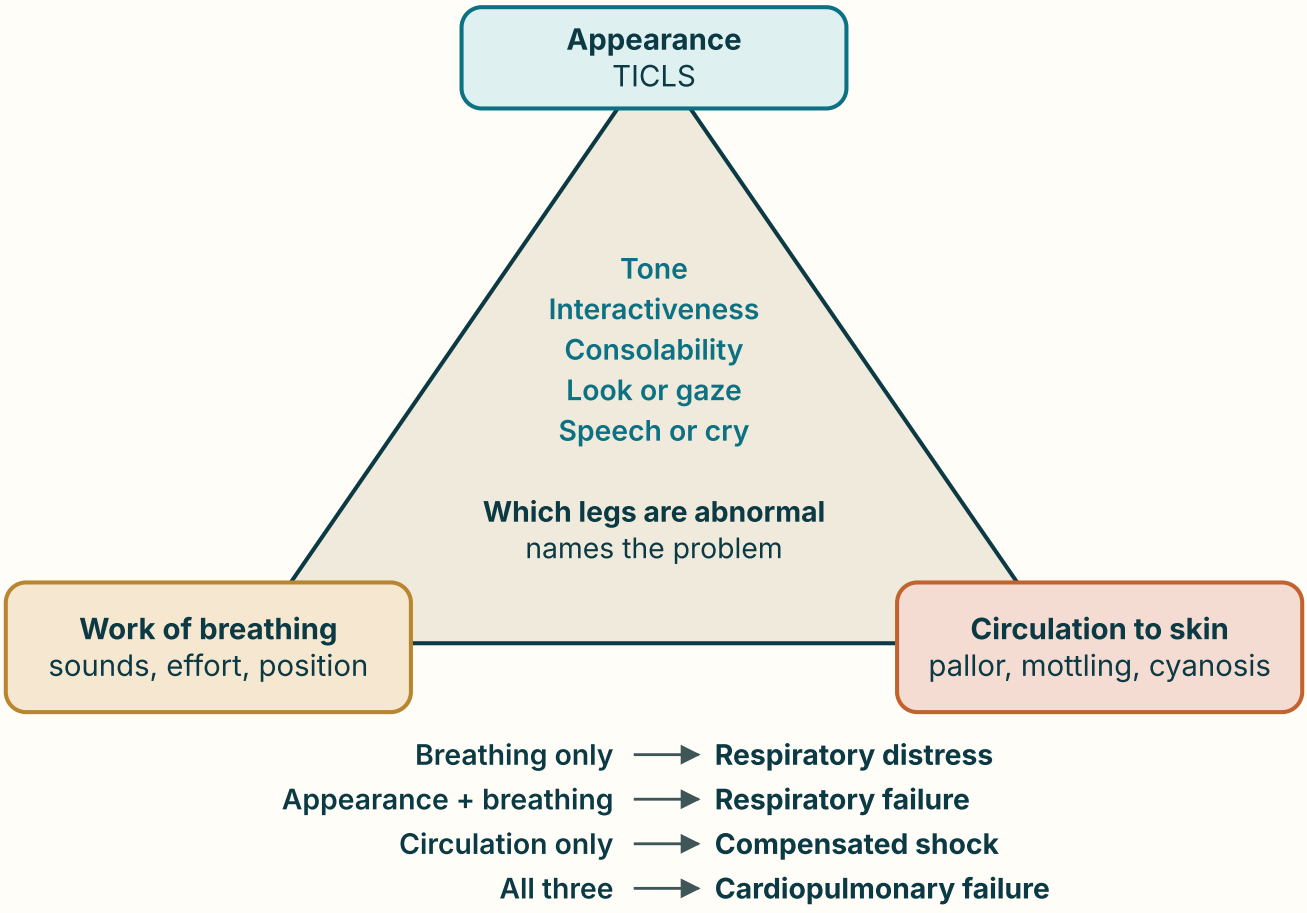
Status epilepticus is 5 minutes or more. First the airway, side-lying, oxygen, monitoring, access, glucose and the exact start time; no restraint, nothing in the mouth. At 5 minutes a benzodiazepine (lorazepam 0.1 mg/kg IV, max 4 mg; or midazolam IM, intranasal or buccal); at 10 minutes one repeat; at 20 minutes a **second-line agent**, not a third benzodiazepine, because GABA receptors disappear as the seizure runs. Seizure with fever plus rash or stiff neck is meningitis until proven otherwise; an unexplained infant seizure raises abusive head trauma.

Septic shock is recognized on perfusion and mental state, not BP: say "sepsis," oxygen, access (IO after two tries or 90 seconds), cultures if they delay nothing, **antibiotics within one hour**, lactate, 10 to 20 mL/kg boluses to 40 to 60 mL/kg; stop fluid if the liver enlarges or crackles appear. **DKA**: fluid first (10 mL/kg over 30 to 60 minutes, or 20 mL/kg rapidly if hypotensive), insulin infusion 1 to 2 hours later at 0.05 to 0.1 units/kg/h, never a bolus, no routine bicarbonate; if potassium is low, start replacement before insulin. A **falling conscious level is treated as cerebral edema before imaging**: slow fluids by about a third, head up, 3 percent saline 2.5 to 5 mL/kg or mannitol.

Poisoning: ABCs and glucose, then what, how much, when; call poison control. **Never induce vomiting.** Charcoal 1 g/kg (max about 50 g) within about an hour in an alert child with a protected airway; it does not bind iron, lithium, alcohols, hydrocarbons or corrosives. One pill can kill a toddler: calcium channel blockers, tricyclics, opioids, sulfonylureas, clonidine. A **button battery** burns through in about two hours: immediate X-ray and endoscopy; honey 10 mL every 10 minutes (max six doses) at 12 months or older within 12 hours. **Choking**: an effective cough is left alone. Ineffective: infant, 5 back blows then 5 chest thrusts; child over 1, 5 back blows then 5 abdominal thrusts. Unresponsive: CPR, look before breaths. **Never a blind finger sweep.**

Ask "could **this child** have done this?" Milestones are a safeguarding tool. "Those who don't cruise rarely bruise": any bruise, intraoral injury or burn in a pre-mobile infant is a **sentinel injury**. **TEN-4-FACESp** flags bruising of the Torso, Ear, Neck, any bruise under 4.99 months, Frenulum, Angle of jaw, Cheek, Eyelid, Subconjunctival hemorrhage and patterned bruises. Posterior rib fractures, metaphyseal corner fractures, a femur fracture in a non-walker, fractures of different ages, immersion burns with sharp lines and retinal plus subdural bleeding raise concern. The duty to report rests on **reasonable suspicion**, is personal, carries good-faith immunity, and does not need the caregiver's permission. Ask open questions once; never promise secrecy. Document what you saw, quote people verbatim, measure and map injuries, and do not date bruises by color. **Poverty is not neglect.** Offer family presence with a dedicated support person. Use SPIKES and say "**died**." After loss, use the baby's name, offer memory-making, warn that milk will come in, and screen mood. After SUID, explain the routine investigation and the ABCs of safe sleep without blame. Children 3 to 5 may think they caused a death; the permanent concept settles by 9 to 10.

The Pediatric Assessment Triangle: a 60-second doorway look



Look before you touch. The triangle uses only what you see and hear from the doorway. The pattern of abnormal legs names the physiological state, and the state names the first intervention.

LOCK THESE IN

- PAT: appearance, work of breathing, circulation to skin; the pattern names the state.
- Glucose in every child with an abnormal appearance.
- Compress for heart rate under 60 with poor perfusion; 15:2 with two rescuers; 2 then 4 J/kg.
- Each 1% dehydration = 10 mL/kg; 1 kg lost = 1 L.
- 4-2-1 and the daily rule meet at 35 kg (75 mL/h).
- Anaphylaxis: IM epinephrine in the thigh first; never stand a hypotensive child up.
- Status: benzodiazepine at 5 min, second-line at 20 min, not a third benzodiazepine.
- Report reasonable suspicion yourself; never a blind finger sweep; say "died."

Reading the Pediatric Assessment Triangle

Appearance	Breathing	Circulation	State	First priority
Normal	Abnormal	Normal	Respiratory distress	Oxygen, position of comfort, calm
Abnormal	Abnormal	Normal	Respiratory failure	Bag-mask ventilation; call now
Normal	Normal	Abnormal	Compensated shock	Access and bolus before BP falls
Abnormal	Normal	Abnormal	Shock reaching the brain	Immediate bolus; escalate
Abnormal	Normal	Normal	Brain or metabolic problem	Glucose; think seizure, poison, sepsis
Abnormal	Abnormal	Abnormal	Cardiopulmonary failure	Resuscitation team

Emergency sequences: first and never

Emergency	Do this first	Never
Anaphylaxis	IM epinephrine 0.01 mg/kg into the thigh	Antihistamine first; sit a hypotensive child up
Status epilepticus	Airway, side, oxygen, time, glucose; benzodiazepine at 5 min	Restrain; a third benzodiazepine
Septic shock	Oxygen, access, antibiotics within 1 h, titrated fluid	Wait for hypotension
DKA	Isotonic fluid; insulin infusion 1 to 2 h later	Insulin bolus; routine bicarbonate
Falling consciousness in DKA	Treat as cerebral edema	Image before treating
Poisoning	ABCs, glucose, what, how much, when; poison center	Induce vomiting
Choking, ineffective cough	Back blows, then chest (infant) or abdominal thrusts	Blind finger sweep

Worked cases

WORKED CASE 1 · GRADE THE DEHYDRATION AND SET THE ORS

A 15 kg four-year-old weighed 15.0 kg last week and weighs 14.1 kg today after vomiting and diarrhea. She is drinking.

STEP 1 · WEIGHT LOST

15.0 minus 14.1 = 0.9 kg, about 900 mL.

STEP 2 · PERCENT

0.9 ÷ 15.0 × 100 = **6 percent**.

STEP 3 · GRADE

Six percent falls in the 5 to 10 percent band, so it is moderate.

STEP 4 · ORS

60 mL/kg × 15 kg = **900 mL** over about 4 hours in 5 to 10 mL sips, plus 10 mL/kg for each extra watery stool. It matches the 900 mL weight loss.

WORKED CASE 2 · WHERE DO THE TWO FLUID RULES MEET?

Compare the hourly 4-2-1 rule and the daily 100-50-20 rule for a 35 kg child.

STEP 1 · HOURLY RULE

(10 × 4) + (10 × 2) + (15 × 1) = 40 + 20 + 15 = **75 mL/h**.

STEP 2 · DAILY RULE

(10 × 100) + (10 × 50) + (15 × 20) = 1,000 + 500 + 300 = 1,800 mL a day.

STEP 3 · CONVERT

1,800 ÷ 24 = **75 mL/h**. The two agree exactly at 35 kg.

STEP 4 · LESSON

Pick one rule and use the other only as a sanity check.

WORKED CASE 3 · ACETAMINOPHEN: THE PER-DOSE AND PER-DAY CEILINGS

An 18 kg child is ordered acetaminophen 15 mg/kg every 4 to 6 hours. The daily ceiling is 75 mg/kg.

STEP 1 · PER DOSE

15 × 18 = **270 mg**.

STEP 2 · PER DAY

75 × 18 = 1,350 mg.

STEP 3 · HOW MANY DOSES

1,350 ÷ 270 = **5 doses** at most in 24 hours. Six would be 1,620 mg, over the ceiling.

STEP 4 · ADOLESCENT CONTRAST

For 60 kg: 900 mg per dose is under 1,000 mg, but 75 × 60 = 4,500 mg exceeds the 4,000 mg adult daily maximum, so the day is capped at 4,000 mg.

WORKED CASE 4 · IS THIS BLOOD PRESSURE DECOMPENSATED?

A seven-year-old with sepsis has a heart rate of 150, capillary refill of 4 seconds and a systolic BP of 82.

STEP 1 · THRESHOLD

70 + (2 × 7) = **84 mm Hg**.

STEP 2 · COMPARE

82 is below 84: decompensated shock.

STEP 3 · ACT NOW

Oxygen, access (IO if two attempts fail), a fluid bolus titrated to perfusion, antibiotics within the hour, glucose and lactate.

STEP 4 · ESCALATE

SBAR with the words "I need you to come now," and the resuscitation team.

TRAPS PEOPLE FALL INTO

- **Skipping the glucose in a child with an abnormal appearance.** Hypoglycemia mimics sepsis, seizure and poisoning and is fixed in ninety seconds.
- **Waiting for pulselessness to start CPR.** Compress for a heart rate under 60 with poor perfusion despite ventilation.
- **Giving a third benzodiazepine at 25 minutes.** Move to a second-line agent; the third dose buys respiratory depression.
- **Imaging a child whose consciousness falls during DKA treatment.** Treat cerebral edema first; image after.
- **Inducing vomiting or doing a finger sweep.** Both cause harm; call poison control and use back blows and thrusts.
- **Saying "we lost her" or "passed away."** Say "died"; euphemisms confuse families and frighten young children.

Chapter 14 self-test · ten items

1. From the doorway, a toddler is alert with retractions and nasal flaring, and his skin color is normal. What is the state?

A. Cardiopulmonary failure
B. Compensated shock
C. Respiratory distress
D. Respiratory failure

C. Respiratory distress Only the work-of-breathing leg is abnormal; appearance is still normal.

2. An irritable 2-year-old is limp and hard to console after a day of vomiting. What is checked first among these?

A. A urine culture
B. A chest radiograph
C. A stool sample
D. A bedside glucose

D. A bedside glucose Every child with an abnormal appearance gets a glucose; hypoglycemia is quickly reversible.

3. What is the hypotension threshold for a 4-year-old?

A. Systolic under 70 mm Hg
B. Systolic under 78 mm Hg
C. Systolic under 86 mm Hg
D. Systolic under 90 mm Hg

B. Systolic under 78 mm Hg 70 plus twice the age: 70 + 8 = 78.

4. An infant with good ventilation has a heart rate of 54 and poor perfusion. What next?

A. Begin chest compressions
B. Prepare to defibrillate now
C. Wait for the pulse to disappear
D. Give a fluid bolus and recheck

A. Begin chest compressions A rate under 60 with poor perfusion despite ventilation is an indication for compressions.

5. A 14 kg child in shock needs a standard bolus. What volume is it?

A. 560 mL
B. 200 mL
C. 140 mL
D. 280 mL

D. 280 mL 20 mL/kg times 14 kg is 280 mL, reassessed afterward.

6. After a bee sting a child has hives, stridor and a BP that is falling. Which action is correct?

A. Sit him up to walk to a cot
B. IM epinephrine, outer thigh
C. An IV steroid before anything
D. An oral antihistamine first

B. IM epinephrine, outer thigh Epinephrine first; never stand or sit up a hypotensive child.

7. A seizure has lasted 25 minutes despite two lorazepam doses. What comes next?

A. A dose of rectal diazepam now
B. Wait another 10 minutes first
C. Second-line levetiracetam
D. A third dose of IV lorazepam

C. Second-line levetiracetam After two benzodiazepine doses, move to a second-line agent.

8. A toddler may have swallowed a button battery an hour ago and is swallowing normally. What is the priority?

A. An immediate X-ray and urgent removal
B. Give activated charcoal by mouth
C. Induce vomiting at home first
D. Wait for it to pass in the stool

A. An immediate X-ray and urgent removal A lodged battery burns through the esophagus in about two hours.

9. Which bruise in a child under 4 is a TEN-4-FACESp warning sign?

A. A bruise on the knee
B. A bruise on the forehead
C. A bruise on the shin
D. A bruise on the ear

D. A bruise on the ear Ears are protected; bruising there suggests a blow or pinch.

10. A nurse suspects abuse and tells the physician, who says he will handle it. Is the nurse's duty met?

A. No, the nurse must see a report is made
B. Only once there is proof of abuse
C. Only if the physician also agrees
D. Yes, telling the physician is enough

A. No, the nurse must see a report is made The duty is personal and non-delegable, triggered by reasonable suspicion.

Cram sheet

Everything from chapters 13 and 14 in one place. Cover the right column and see if you can rebuild each row.

Numbers to know

Item	Value	Note
Urine output	Infant 2, child 1, adolescent 0.5 to 1 mL/kg/h	1 g diaper = 1 mL
Weight loss	1 kg = 1 L deficit	Gold standard
ORS	50 mL/kg mild; 100 mL/kg moderate	Over 4 h; plus 10 mL/kg per stool
Bolus	20 mL/kg; 10 mL/kg special cases	Reassess each time
DKA insulin	0.05 to 0.1 units/kg/h	No bolus; after fluids
ANC	WBC × (segs + bands) ÷ 100	Under 500 severe
IM epinephrine	0.01 mg/kg of 1 mg/mL	Thigh; repeat 5 to 15 min
Lorazepam	0.1 mg/kg IV, max 4 mg	At 5 minutes

Sequences and rules

Situation	Rule	Never
Severe dehydration	Access, 20 mL/kg isotonic bolus	Dextrose bolus
Pyloric stenosis	Fix electrolytes before surgery	Rush to theater
Sickle pain crisis	Fluids, scheduled analgesia, O2 if under 95%	Meperidine
Hemophilia head injury	Factor first, then scan	Delay factor for imaging
Febrile neutropenia	Antibiotics within 60 min	Rectal temperatures
Compartment syndrome	Report; limb at heart level	Elevate above heart
Safeguarding	Report on reasonable suspicion	Promise a child secrecy
Bad news	Warning shot, SPIKES, the word "died"	Euphemisms

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