Foundations Frameworks

Approach to the Sick Neonate

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1. Rapid assessment and identification of the sick neonate:

The Pediatric Assessment Triangle: a rapid approach for evaluating sick neonates

- *Appearance*: use "tickles" (TICLS) mnemonic
  - Tone
  - Interactivity
  - Consolability
  - Look/gaze
  - Speech/cry
- *Work of Breathing*
  - Airway sounds, abnormal positioning, retractions, flaring, head bobbing

- *Circulation*
  - Skin exam: pallor, mottling, cyanosis, cap refill

Relationship of the PAT components to physiological categories and management priorities

Presentation	Appearance	Work of breathing	Circulat'n to skin	Management priorities
Stable	Normal	Normal	Normal	Specific therapy based on possible etiologies
Respiratory distress	Normal	Abnormal	Normal	Position of comfort, O_2/suction, specific therapy (e.g. albuterol, diphenhydramine, epinephrine), labs/x-rays
Respiratory failure	Abnormal	Abnormal	Normal or Abnormal	Position head/open airway, BVM, FB removal, advanced airway, labs/x-rays
Shock (compensated)	Normal	Normal	Abnormal	O_2, peripheral IV, fluid resuscitation, specific therapy based on etiology (antibiotics, surgery, antidysrhythmics), labs/x-rays
Shock (decompensated/ hypotensive)	Abnormal	Normal or Abnormal	Abnormal	O_2, vascular access, fluid resuscitation, specific therapy based on etiology (antibiotics, vasopressors, blood products, surgery, antidysrhythmics, cardioversion), labs/x-rays
CNS/Metabolic dysfunction	Abnormal	Normal	Normal	O_2, POC glucose, consider other etiologies, labs/x-rays
Cardiopulmonary failure/arrest	Abnormal	Abnormal	Abnormal	Position head/open airway, BMV with 100% O_2, CPR, specific therapy based on etiology (defibrillation, epinephrine, amiodarone), labs/x-rays

2. Stabilization of Vitals:
    a. Airway/Breathing:
        i. Assess respiratory rate, work of breathing, oxygen saturation
            1. Respiratory distress or hypoxia -> O2 supplementation -> HFNC -> BVM -> intubate
                a. Think about: sepsis, CHD, inborn errors of metabolism (w/metabolic acidosis), pulmonary malformations
    b. Circulation:
        i. Evaluate end organ perfusion -> cap refill, pulse, BP
            1. Poor perfusion -> fluid bolus
                a. Access: IV or IO then 20 mL/kg bolus
                    i. If any concern for congenital heart disease/ CHF, would start with 10 mL/kg NS bolus. Make sure to check liver edge first
                b. If clinically improving with first bolus, you can potentially do two more NS boluses
                c. Kids < 1 yo: MAP of at least 40 + gestational age in weeks (40 weeker = MAP of 40, 1 month = MAP of about 45)
            2. No improvement -> vasopressors
                a. Warm extremities -> consider norepinephrine
                b. Cold, clammy extremities -> consider epinephrine
            3. Less than 1mo old? Consider congenital heart disease and treatment with prostaglandins
                a. Consider starting PGE to open ductus arteriosus in suspected congenital heart disease (murmur, liver edge, pulm edema, abnormal pulses from coarctation)
                b. Be prepared for possible apnea and/or hypotension with PGE infusion
                c. CHD is much more likely if you cannot improve O2 sats with supplemental oxygen. PGE is a viable option even up to 30 days as you may be able to reopen the ductus.
                d. In theory, initial presentations of CHD in ED is becoming more rare due to O2 screening prior to discharge from newborn nursery and prenatal US.
                e. Cardiac kids:
                    i. Pulmonary flow limited (blue babies with low oxygen saturation) or systemic flow limited (hypotensive babies with wet lungs and an abnormally palpable liver edge)
                    ii. 5 common causes of cyanotic heart disease:
                        1. Truncus arteriosus
                        2. TGA
                        3. Tricuspid atresia
                        4. TOF
                        5. TAPVR
                    iii. You need 3 things to begin diagnosing the problem if cardiac:
                        1. Pulse Ox (blue or red?)
                        2. Chest XR

a. Wet → systemic limited flow
b. Dry → pulmonary limited flow

3. 4 extremity BP (to r/o coarctation- most sensitive finding will be lack of femoral pulses or weaker femoral pulses)

c. Glucose- give dextrose if < 50
    i. Hypoglycemia Pearl: hypoglycemia plus no urine ketones = consider inborn error of metabolism -> start D10 and 1.5 x maintenance dose
    ii. Rule of 50 for straightforward hypoglycemia → should always equal to 50
        1. D10 – give 5 mL/kg (use D10 in neonates)
        2. D25 – give 2 mL/kg

d. Sepsis -> obtain cultures, LP, labs, and start antibiotics
    i. Vancomycin, ampicillin, cefotaxime or gentamycin, acyclovir
    ii. Be concerned for herpes encephalitis if blood in CSF

3. Run your differential of sick kids now that they are stabilized.

THE MISFITS mnemonic:

- Trauma: birth trauma, non-accidental
- Heart: congenital heart disease, hypovolemia, hypothermia
- Endocrine: congenital adrenal hyperplasia, thyroid, hypoglycemia
- Metabolic: electrolyte abnormalities
- Inborn errors of metabolism: check glucose, urine, ammonia, lactate
- Seizure: check glucose, sodium, and iCal in young babies, as hyponatremiaand hypocalcemia is a common cause of seizures in the neonatal period
- Formula disasters: hypo/hypernatremia
- Intestinal catastrophe: NEC, volvulus, intussusception (rare before 6 months)
- Toxins: take thorough history (methemoglobinemia can present in neonatal period due to immature enzymes in setting of stress)
- Sepsis

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