Advanced Respiratory Assessment in the School-aged Child

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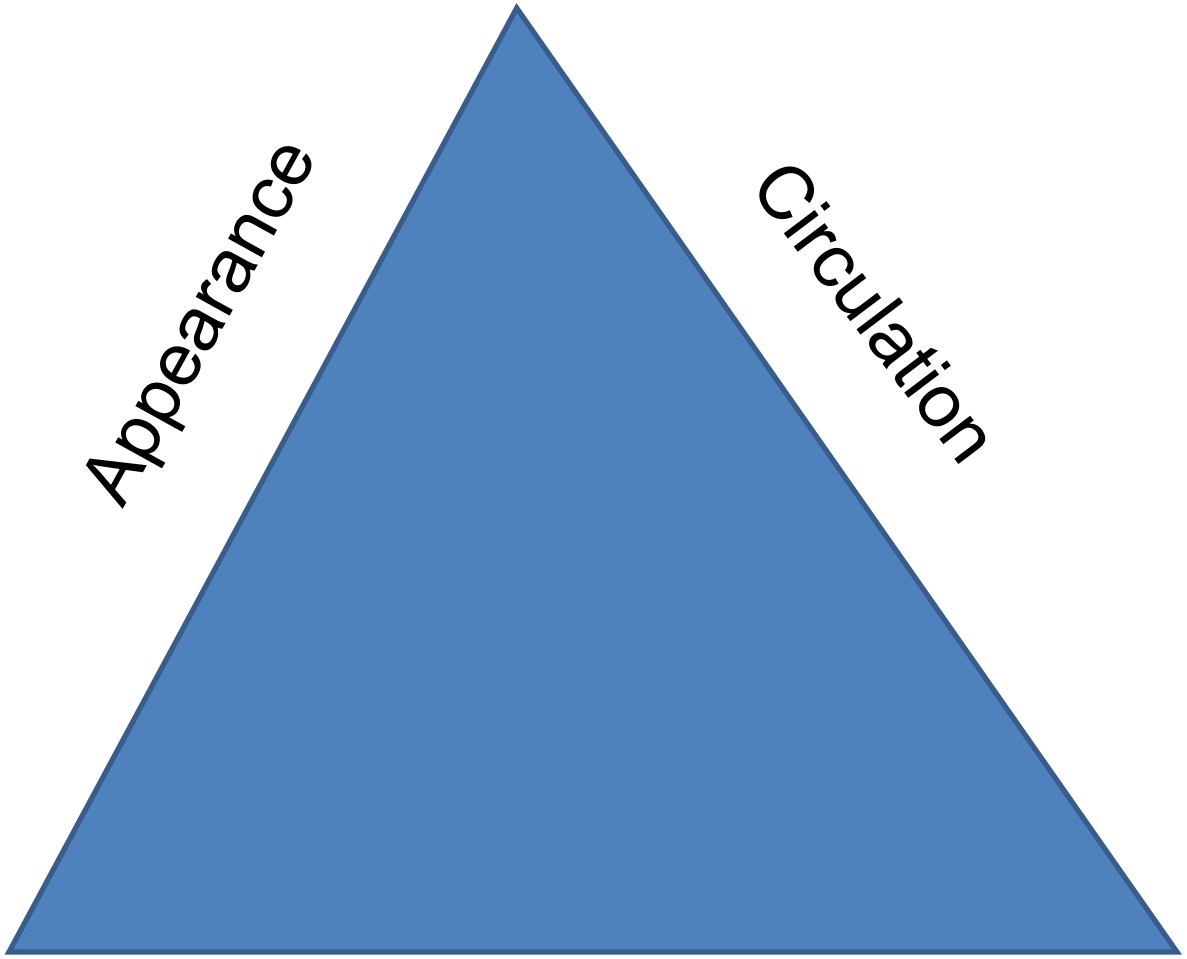
A is for Airway…

- Respiratory distress
- Respiratory failure
- Cardiopulmonary failure
- Cardiac arrest

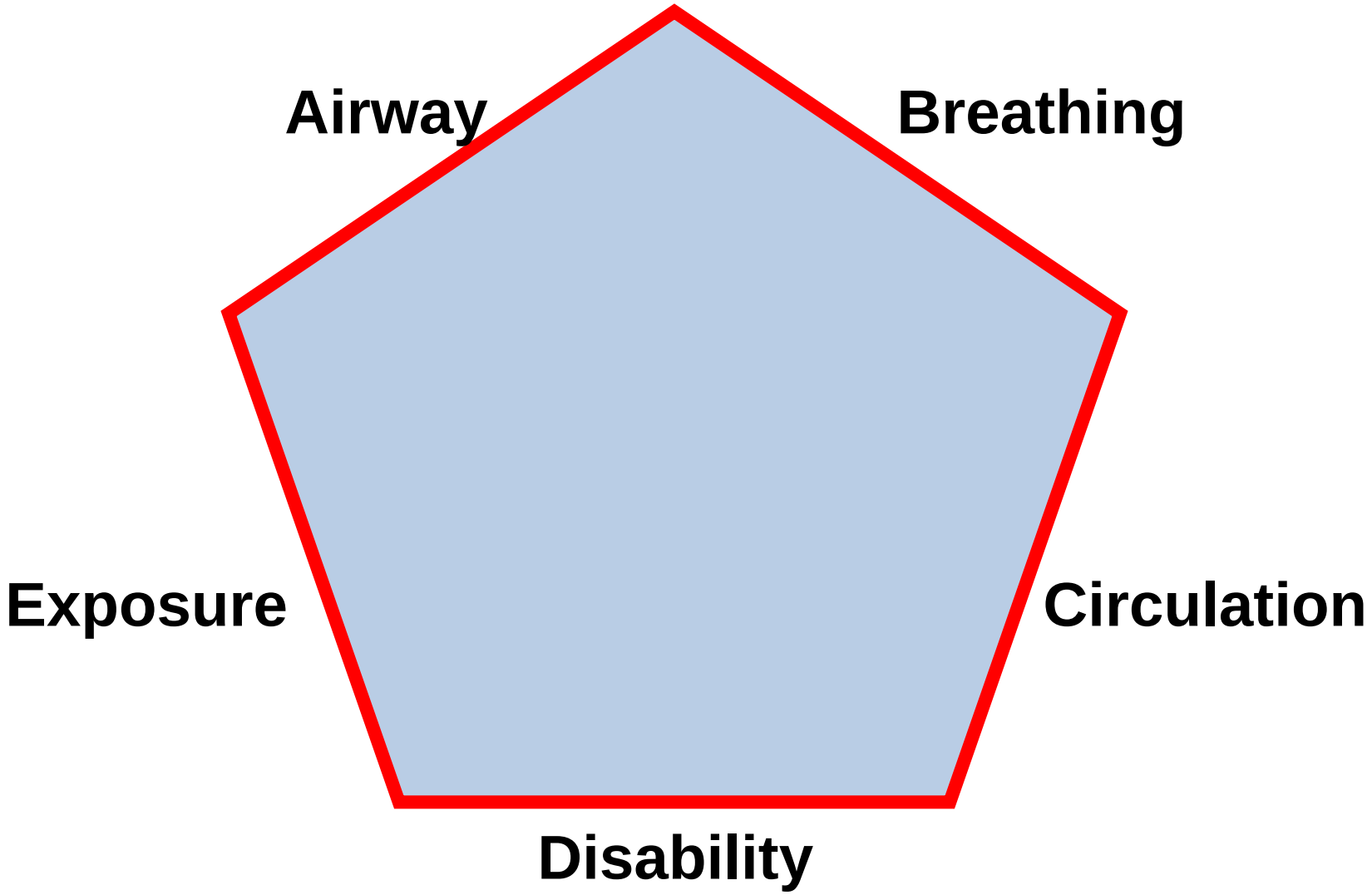
B is for Breathing

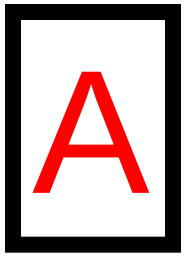
- Outside of the hospital setting, only 5-12% of children who experience cardiac arrest survive to hospital discharge
- An organized, well thought-out plan of assessment is critical
- A plan should be in place BEFORE you need it

Pediatric Assessment Triangle (PAT)



A, B, C, D, E





Airway

- Chest movement
- Breath sounds
- Movement of air at the nose and mouth
- Is the airway open and maintainable?

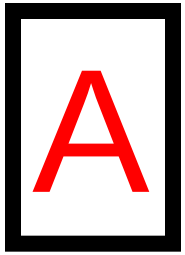
B

Breathing

- Respiratory rate
- Respiratory effort
- Tidal volume
- Airway and lung sounds
- Pulse oximetry

B Normal Respiratory Rates

AGE	BREATHS PER MINUTE
Infant (< 1 year)	30-60
Toddler (1 to 3 years)	24-40
Preschooler (4-5 years)	22-34
School age (6-12 years)	18-30
Adolescent (13-18 years)	12-16



Variations of Rate

- Tachypnea-more rapid respiratory rate associated with high fever, pain, mild metabolic acidosis with dehydration and sepsis
- Bradypnea-slower than normal rate in an acutely ill child often signals impending arrest
- Apnea-absence of inspiratory flow for 20 seconds

B

Respiratory Effort

- Nasal flaring
- Chest retractions (use of accessory muscles)
- Head bobbing or seesaw respirations
- Prolonged inspiratory or expiratory phases
- Open mouth breathing
- Gasping
- Tripoding
- Grunting

B

Tidal Volume

- Observation of chest wall excursion
  - Chest rise during inspiration
  - Should be symmetrical
  - Must be done without covering by clothing
- Auscultation of air movement
  - Intensity of breath sounds
  - Quality of breath sounds
  - Best assessed below the axillae both anteriorly and posteriorly
  - May be difficult to assess in the obese child

B Abnormal Breath Sounds

- Stridor-coarse, usually high pitched sound typically on inspiration but may also be heard on expiration. Sign of upper airway obstruction such as foreign body, infection, congenital or acquired abnormalities or upper airway edema

B Abnormal Breath Sounds

- Grunting-short, low pitched heard during expiration
- Can be response to pain or fever
- Also used to help keep the small airways and alveolar sacs open to optimize oxygenation and ventilation
- Sign of small airway and/or aveolar collapse

B Abnormal Breath Sounds

- Wheezing-a high pitched or low pitched whistling sound heard during expiration then expiration and inspiration
- Absence of wheezing should not be considered a “good sign”, may not be moving enough air to generate airway sounds

B Abnormal Breath Sounds

- Crackles (also called rales) -sharp, crackling sounds heard on inspiration
- Indicate accumulation of fluid if moist
- Dry crackles sound like rubbing your hair between your fingers close to your ear

B

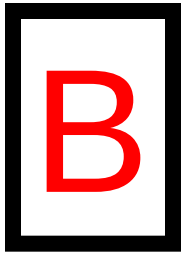
Pulse Oximetry

- MUST be used in conjunction with other signs and symptoms obtained during your assessment
- If HR on monitor does not correlate with VS the monitor is not accurate
- Inconsistent pulse or poor waveform could indicate poor distal perfusion

B

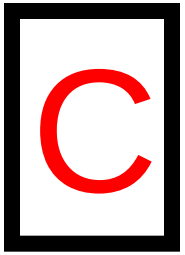
Pulse Oximetry

- Only calculates the O2 in the hemoglobin, not O2 content of blood or delivery of O2 to the tissues
- In respiratory distress children can maintain pulse ox at or above 95% until they fatigue then the sats can drop very quickly



Breath Sound Website Here

- http://www.stethographics.com/main/physiology_ls_introduction.html



Circulation

- Skin color and temperature
- Heart rate and rhythm
- Blood pressure
- Pulses (peripheral and central)
- Capillary refill time
- Brain perfusion (mental status)
- Skin perfusion
- Renal perfusion (urine output)

C

Circulation-Heart Rate

AGE	AWAKE RATE
2-10 years	60-140
>10 years	60-100

C Circulation-Blood Pressure

- Definition of Hypotension / Systolic BP

AGE	SYSTOLIC BP (mm Hg)
1-10 years (5th BP percentile)	< 70 + (age in years x 2)
Children > 10 years	< 90

C Other Parameters to Monitor

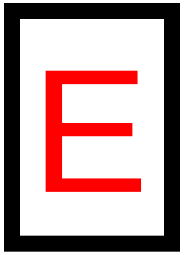
- Pulses- central and peripheral
- Capillary refill time-normal is less than 2 seconds
- Brain-level of consciousness, muscle tone an pupillary responses
- Skin – mottling, palor, cyanosis
- Renal perfusion normal urine output in older children and adolescents is 1mL/kg per hour

D

Disability

- A quick evaluation of 2 main components of the central nervous system, the cerebral cortex and the brainstem to establish LOC

A	Alert	Awake, active and responds appropriately to familiar adults and external stimuli.
V	Voice	Response only when the child's name is called or someone speaks loudly
P	Painful	Only response to a painful stimulus, such as pinching the nail bed
U	Unresponsive	Does not respond to any stimulus



Exposure

- Examination of the undressed child to facilitate a focused physical exam
- Observe face, trunk (front and back), extremities, and skin
- Look for evidence of trauma (bleeding, burns, or unusual markings), palpate the extremities and immobilize areas that are of concern
- CORE TEMPERATURE-reverse or prevent hypothermia.

SAMPLE

- **S**-signs and symptoms
- **A**-allergies
- **M**-medications
- **P**-past medical history
- **L**-last meal
- **E**-events

Signs and Symptoms

- ABCDE plus fever, diarrhea, vomiting, bleeding fatigue time course of symptoms
  - When did symptoms begin
  - What was the patient doing when they began
  - Have they been constant since onset
  - What makes them better
  - What makes them worse

Allergies

- Medications, foods, latex, insects

Medications

- Medications, last dose and time of recent medications.
- Remember to include over the counter and illicit drugs

Past Medical History

- Health history (eg premature birth)
- Significant underlying medical problems, (asthma, chronic lung disease, congenital heart disease, arrhythmias, congenital airway abnormalities, seizures, head injury, brain tumor, diabetes, hydrocephalus, neuromuscular disease0
- Past surgeries
- Immunization status

Last Meal

- Time and nature of last liquid or food
- Possible cross contamination of food if allergic
- Did they eat someone else's lunch if food allergic
- What/when was last liquid

Events

- Events leading to current illness or injury (was onset sudden or gradual)
- Hazzards at scene
- Interval treatment if any
- What did others observe

References

- American Heart Association. Pediatric Advanced Life Support - Provider Manual. Laerdal Medical Corporation; Wappingers Falls, NY 2006
- Jarvis C. Physical Examination and Health Assessment. Saunders; St Louis, MO. 2000.

Case Study