

Advanced Respiratory Assessment in the School-aged Child

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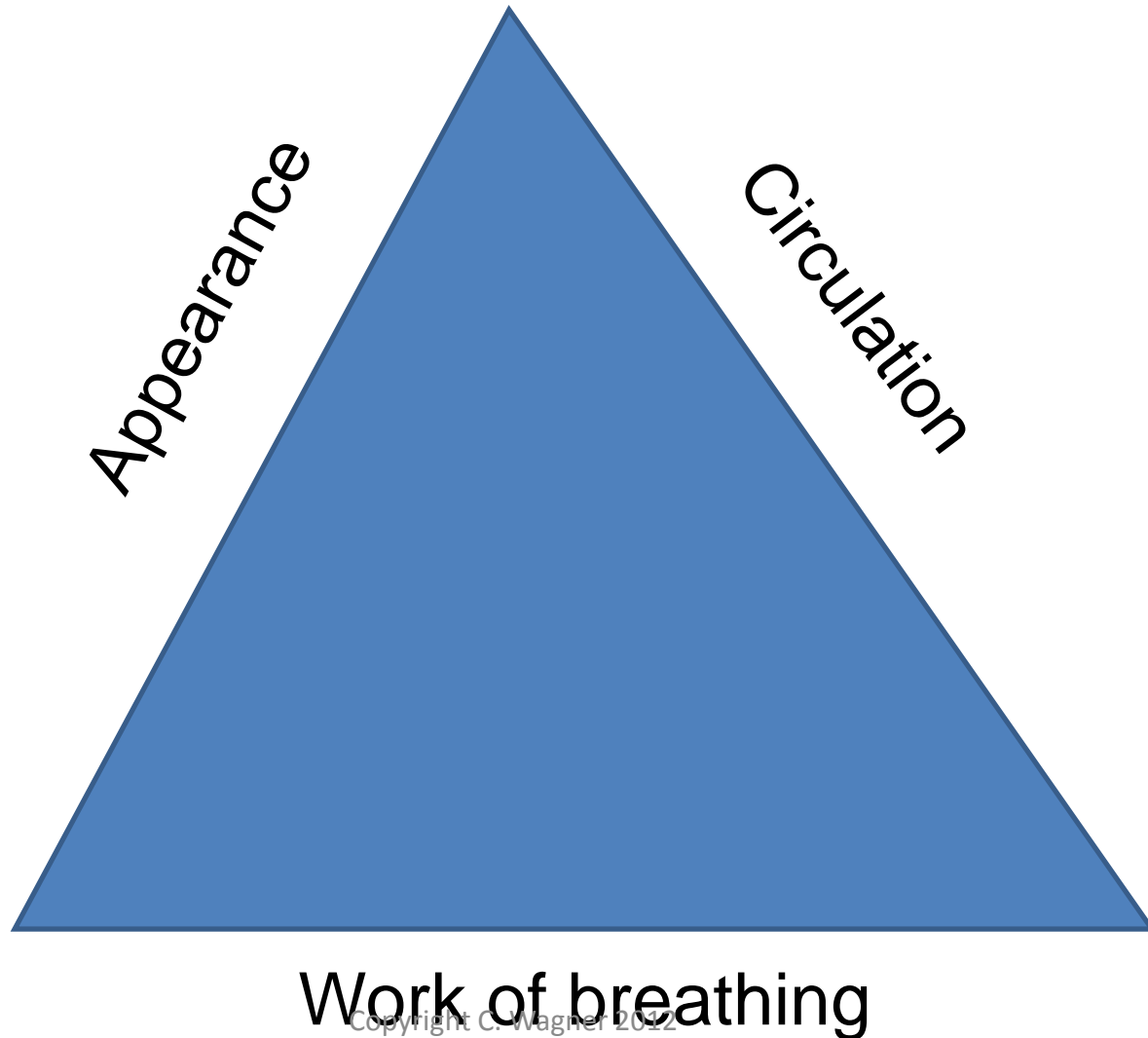
A is for Airway...

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

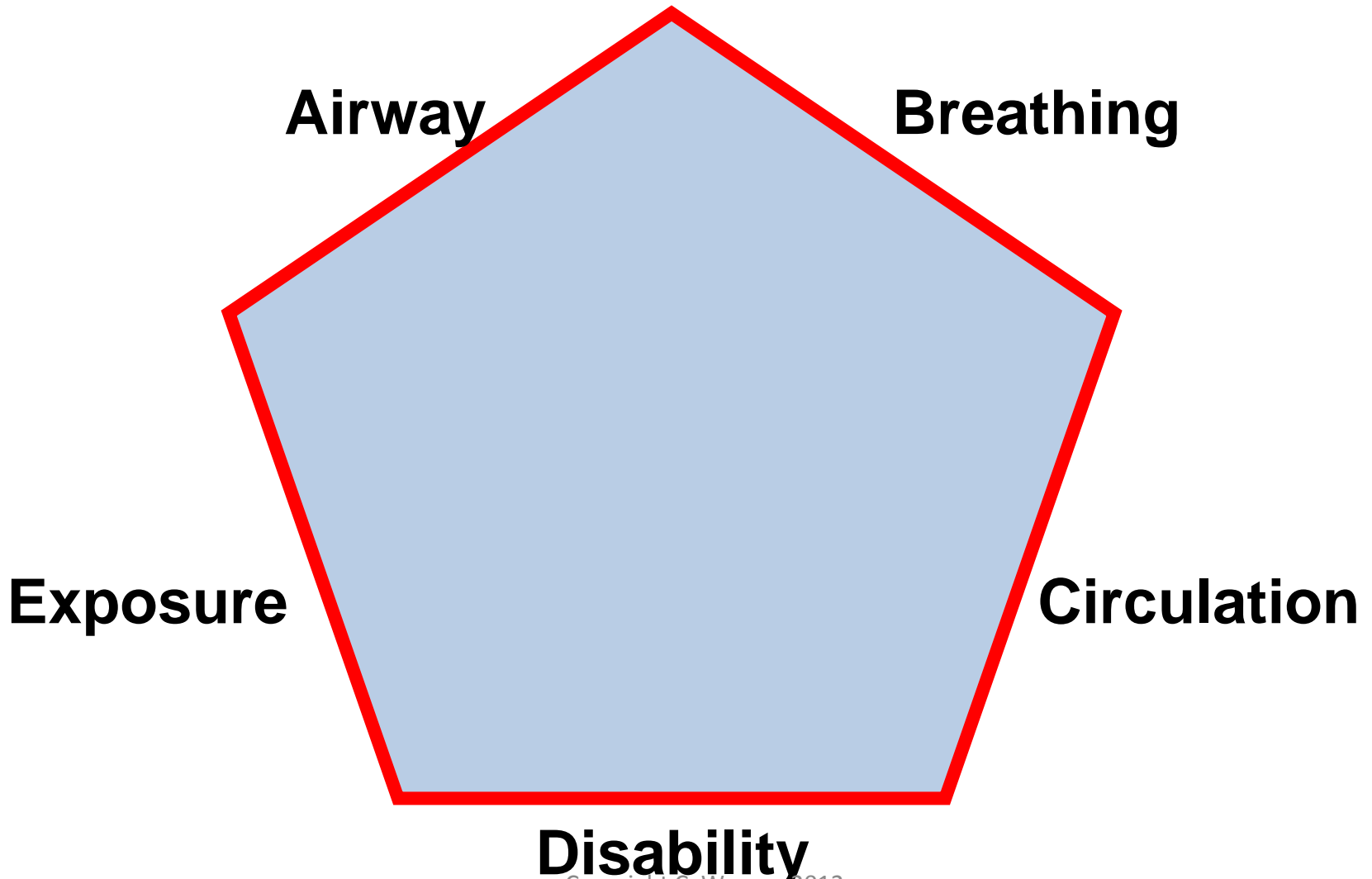
B is for Breathing

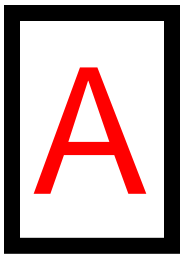
- Outside of the hospital setting, only 5-12% of children who experience cardiac arrest survive to hospital discharge
- An organized, well thought-out plan of assessment is critical
- A plan should be in place **BEFORE** you need it

Pediatric Assessment Triangle (PAT)



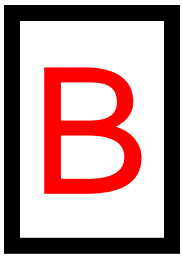
A, B, C, D, E





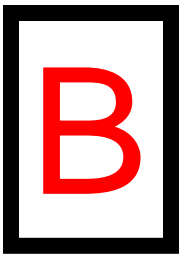
Airway

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



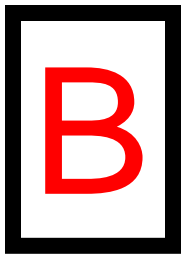
Breathing

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



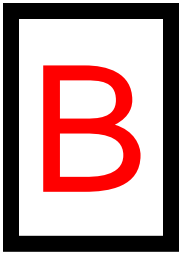
Normal Respiratory Rates

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



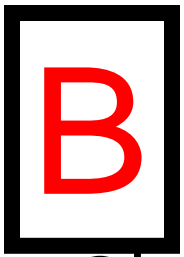
Variations of Rate

- 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



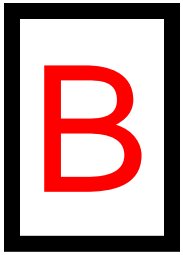
Respiratory Effort

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



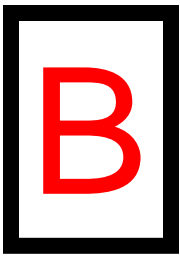
Tidal Volume

- 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



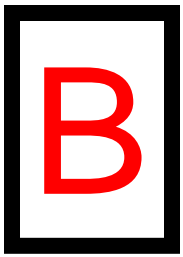
Abnormal Breath Sounds

- 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



Abnormal Breath Sounds

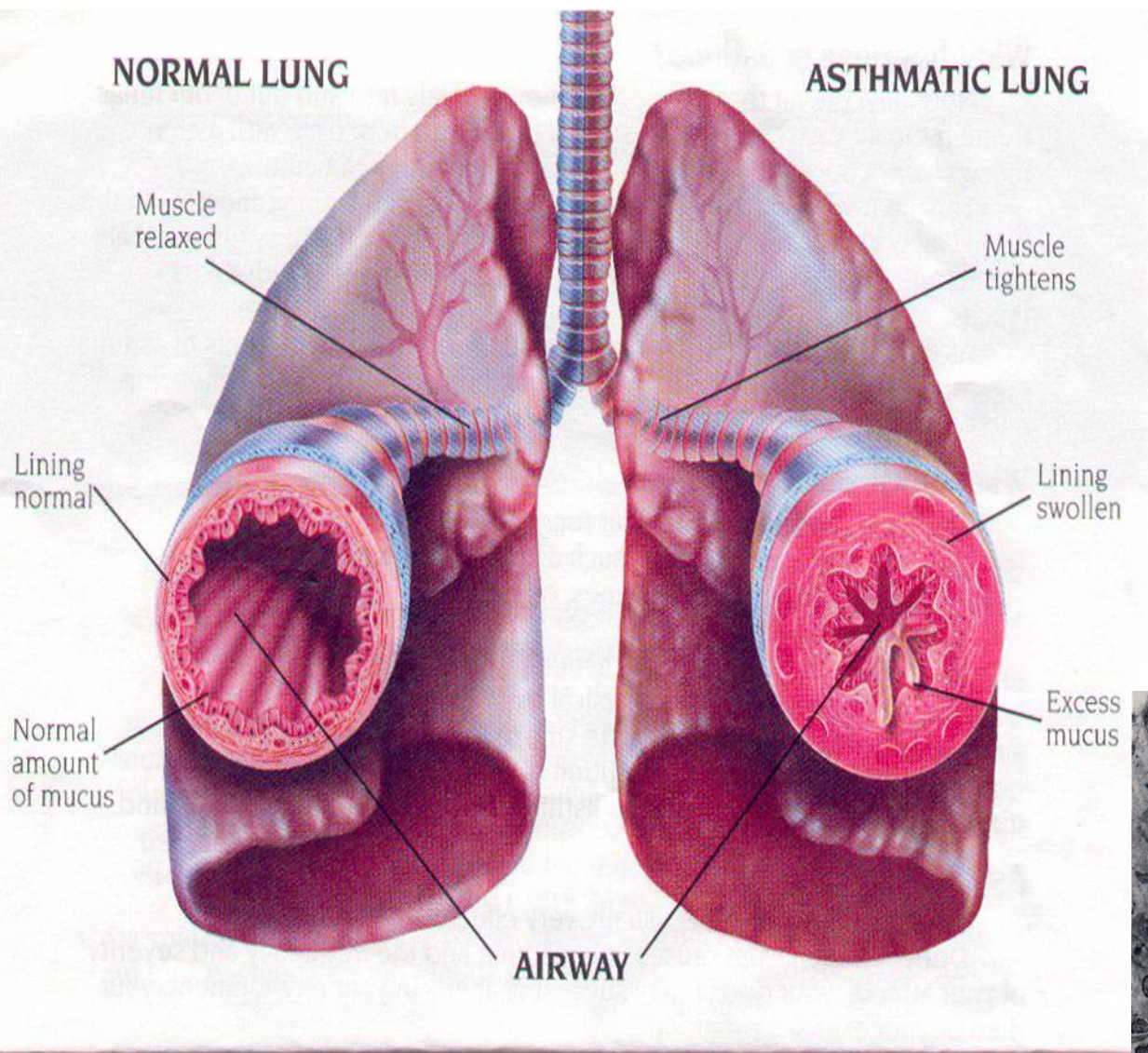
- Grunting-short, low pitched heard during expiration
- Can be response to pain or fever
- Also used to help keep the small airways and alveolar sacs open to optimize oxygenation and ventilation
- Sign of small airway and/or alveolar collapse



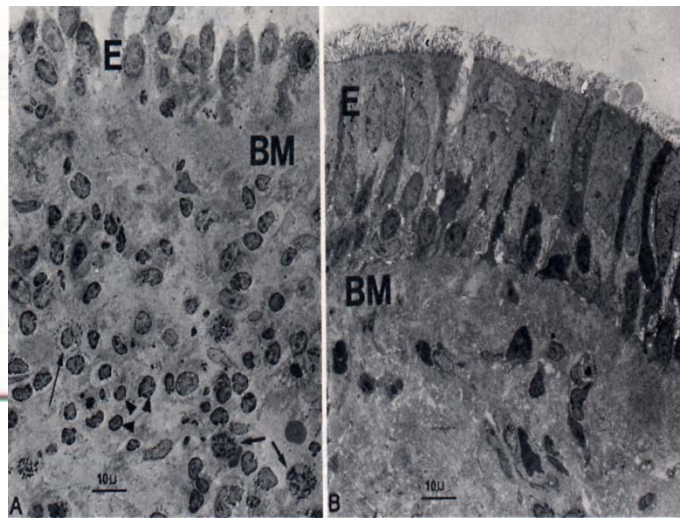
Abnormal Breath Sounds

- 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

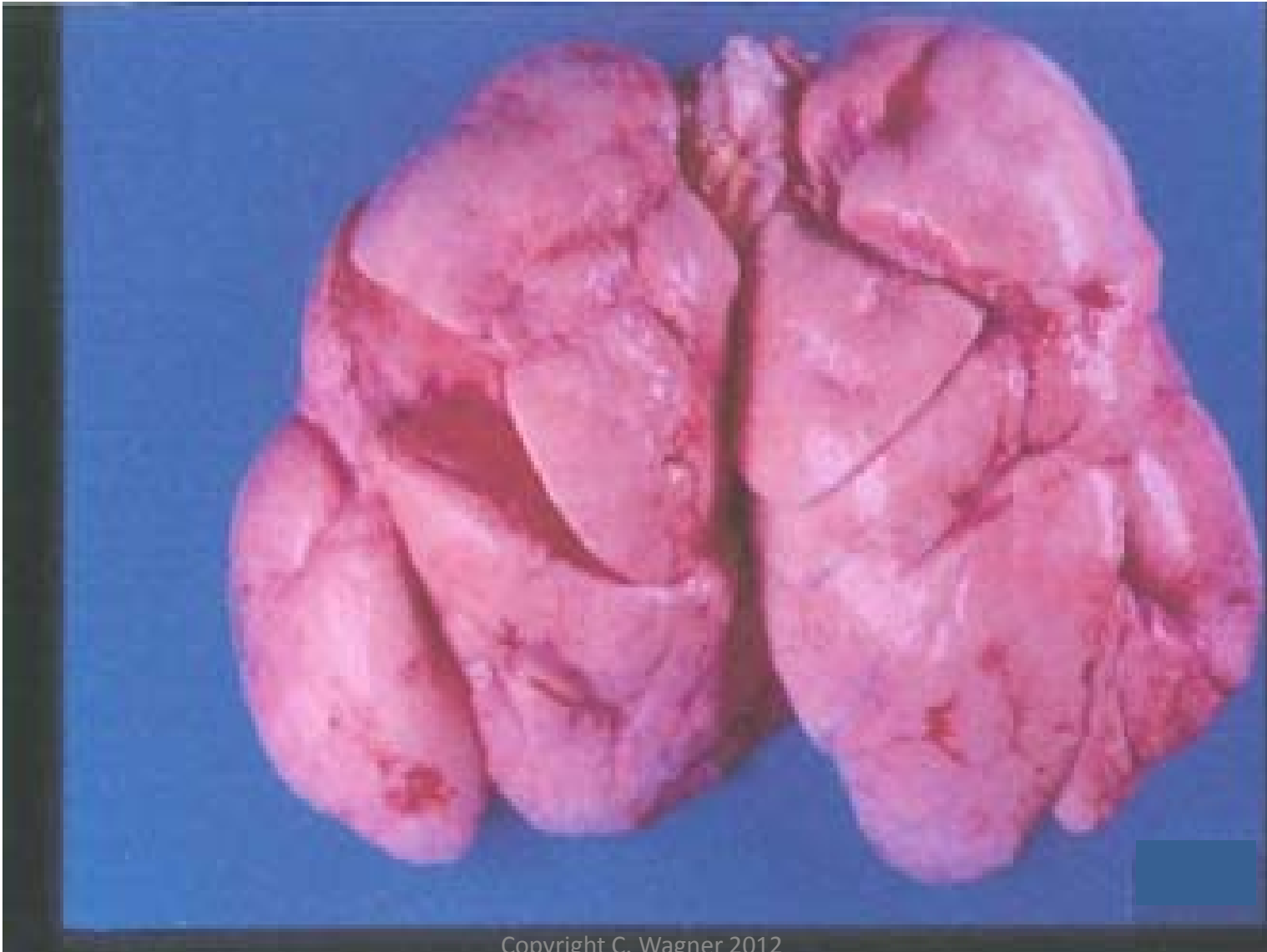
What is Asthma?



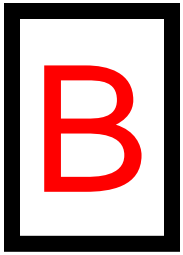
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Status Asthmaticus

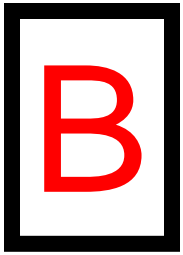


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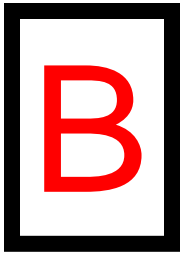
Abnormal Breath Sounds

- 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



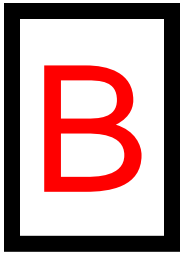
Pulse Oximetry

- 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



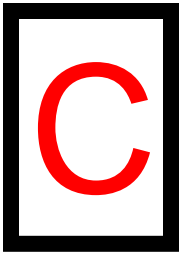
Pulse Oximetry

- 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



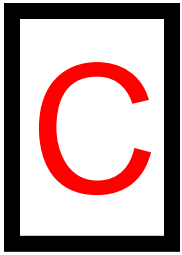
Breath Sound Website Here

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



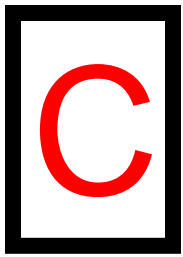
Circulation

- 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)



Circulation-Heart Rate

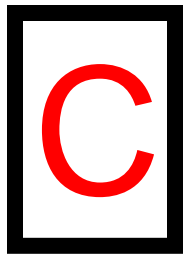
AGE	AWAKE RATE
2-10 years	60-140
>10 years	60-100



Circulation-Blood Pressure

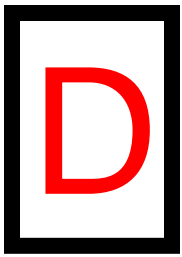
- Definition of Hypotension / Systolic BP

AGE	SYSTOLIC BP (mm Hg)
1-10 years (5 th BP percentile)	$< 70 + (\text{age in years} \times 2)$
Children > 10 years	< 90



Other Parameters to Monitor

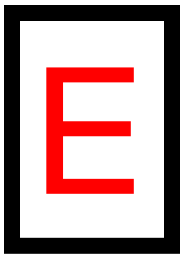
- Pulses- central and peripheral
- Capillary refill time-normal is less than 2 seconds
- Brain-level of consciousness, muscle tone and pupillary responses
- Skin – mottling, palor, cyanosis
- Renal perfusion normal urine output in older children and adolescents is 1mL/kg per hour



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 disease)
- 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)
- Hazards 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

- Warren P is an 11 year old male student who comes into your clinic crying. Warren states he can't breathe and needs his inhaler. You know Warren has a history of asthma but he has rarely come into your clinic for his inhaler and has never been upset like he is now. The teacher who accompanied Warren to the clinic says he was playing on the monkey bars and classmates told her he fell off just before he started to complain of breathing problems. What is your next action?

Case Study

- Upon examination Warren has a red area on his left arm and side correlating with where he fell. He has good range of motion in the arm and no crepitus. His pulse and BP are within normal ranges for his age and his respiratory rate is 44. He has equal but diminished breath sounds with no wheezing noted. He is unable to do a peak flow because he is still crying.

Case Study

- What is your differential diagnosis for Warren and what are your next actions?
- What other information do you want to collect regarding Warren?

Nebulizer Protocol

- For information about existing school nebulizer protocols contact christine.wagner@childrens.com