

Pediatric Readiness Program Education Session

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PEDIATRIC READINESS PROGRAM

SERVING OREGON & SW WASHINGTON

Pediatric and Neonatal Respiratory Distress Assessment and Management

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NOVEMBER 16, 2023

Objectives

- ▶ Describe respiratory assessment strategies for pediatric and neonatal patients
- ▶ Identify respiratory distress and respiratory failure in this population
- ▶ Summarize respiratory management strategies for pediatric and neonatal patients

CME Disclosure

None of the planners and faculty for this educational activity have relevant financial relationship(s) to disclose with ineligible companies whose primary business is producing, marketing, selling, reselling, or distributing healthcare products used by or on patients.

Agenda

- ▶ Why is this important?
- ▶ Respiratory Assessment in children
- ▶ Distress versus Failure
- ▶ Interventions
- ▶ Questions

Pediatric Readiness

- ❑ Children represent approximately 25% of all emergency department visits
- ❑ In 2021, General EDs accounted for 78.8% of total pediatric ED visits
- ❑ Although children account for some 30 million ED visits every year in the United States, most are seen in EDs that evaluate <15 children per day
- ❑ Improved pediatric readiness = improved pediatric outcomes
- ❑ The 2021, the average pediatric readiness scores in the US was 69.5/100

Pediatric Readiness

High pediatric readiness in EDs is associated with:

76%

lower mortality
rate in ill children^{1,2}

60%

lower mortality rate in
injured children²

**AT
LEAST 1,400**

children's lives saved
across the US each year²

Respiratory Assessment in Children

- ▶ Doorway Assessment
- ▶ The examination of the pediatric patient begins before even touching the patient.



Pediatric Assessment Triangle (PAT)

Appearance

Work of Breathing

Circulation

Used to form a general impression



Assessment Triangle: APPEARANCE

- ▶ **Tone** - Moves spontaneously, resists examination
- ▶ **Interactivity** - Interacts with environment, reaches for items
- ▶ **Consolability** - Comforted by caregiver
- ▶ **Look/gaze** - Makes eye contact
- ▶ **Speech/cry**



NORMAL & ABNORMAL APPEARANCE



Assessment Triangle: WORK OF BREATHING

- ▶ **Airway Sounds** – stridor, grunting, wheezing, or absence of sounds
- ▶ **Positioning** – position of comfort
- ▶ **Breathing Pattern** – rate and regularity
- ▶ **Accessory Muscle Use** – retractions, nasal flaring, head bobbing



Grunting, Nasal Flaring, Retractions



Assessment Triangle: CIRCULATION

- ▶ **Pallor** - paleness
- ▶ **Mottling** – peripheral or central
- ▶ **Cyanosis** - blue



Vital Signs

Respiratory Rate



- Normal
- Distress
- Fever



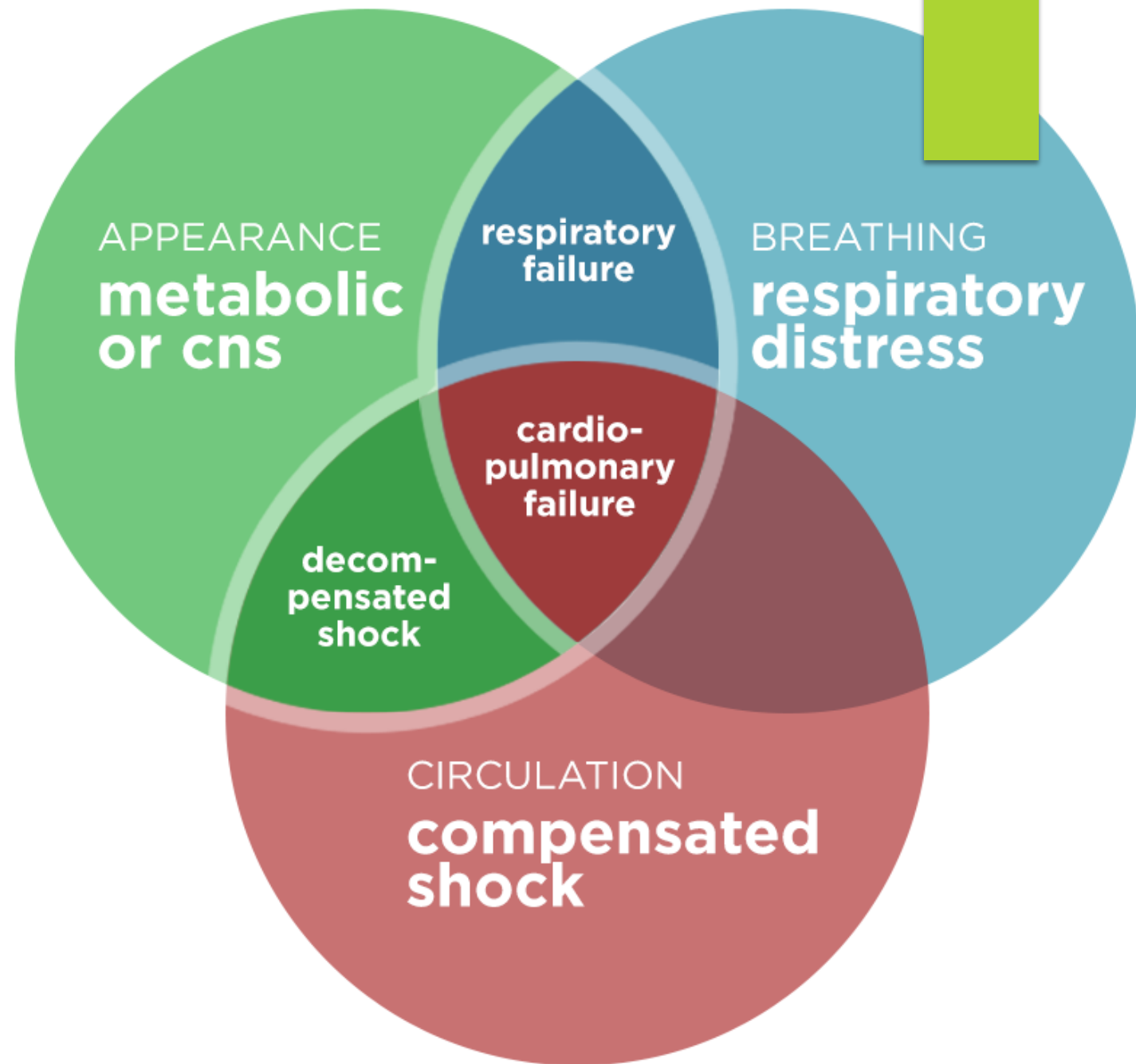
- Abnormal
- Failure
- Impending arrest

Pulse Oximetry

> 95%



Respiratory Distress or Failure?





Distress or Failure

HOW FAST DO WE NEED TO ACT?

Case #1: Respiratory Distress or Failure?

- ▶ **Patient history:** 2 week old presented to PCP with poor feeding, decreased wet diapers.
- ▶ **Doorway assessment:** swaddled in a blanket, asleep in parent's arms.
- ▶ **PAT: Appearance** - unbothered by assessment, low tone
- ▶ **PAT: Work of Breathing** - periodic breathing with 20 second pauses
- ▶ **VS:** HR 150, RR 18, BP 65/45, Sat 95%, Temp 34.8 C/94.6 F



Case #2: Respiratory Distress or Failure?

- ▶ **Patient history:** 11 month old with 2-day history of cough and runny nose. Developed fever overnight, this morning parents noted visible change in breathing, called nurse triage line, instructed how to count RR (62) and identified tracheal tugging. Presented to the ER.
- ▶ **Doorway assessment:** Awake, sitting upright on a gurney, playing with a toy.
- ▶ **PAT: Appearance** - alert, interactive, appropriate gaze. Cries with assessment, consoles with parent.
- ▶ **PAT: Work of Breathing** - head bobbing, nasal flaring, intercostal retractions, tachypnea
- ▶ **VS:** HR 182, RR 56, BP 80/50, Sat 94%, Temp 39 C/102.2 F



Case #3: Respiratory Distress or Failure?

- ▶ **Patient history:** 4 year old with known RAD. One day history of respiratory symptoms. EMS called for severe worsening dyspnea not improved after at home albuterol administration.
- ▶ **Doorway assessment:** Tripod position on gurney. Stoic/anxious.
- ▶ **PAT: Appearance** - focused, not making eye contact, answers questions with 1-word sentences
- ▶ **PAT: Work of Breathing** - suprasternal and subcostal retractions, prolonged expiratory phase, no breath sounds on auscultation
- ▶ **VS:** HR 135, RR 14, BP 92/48, Sat 92%, Temp 37 C/98.6 F





Interventions for the Neonate and Pediatric Patient

Case #1: Respiratory Distress or Failure?

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Rescue Devices

Which do you have??

- Neo Puff
- Neo Tee
- Ambubag

And do you know how to use them?



Patient #1 – Neonate

- ▶ First intervention – aggressive nose suctioning
 - ▶ Neonates = obligate nose breathers (kind of)
- ▶ Consideration – minimize heat loss in the sick neonate
 - ▶ Place them under a warmer
 - ▶ Swaddle in warm blankets when not assessing
 - ▶ Put a hat on the baby
- ▶ Respiratory support options
 - ▶ NC with low flow
 - ▶ HiFlow NC (1-2ml/kg)
 - ▶ Bubble CPAP/Mask CPAP



Patient #1 Neonate - Continued

- ▶ Despite our interventions, pt continues to have periods of apnea and desats.
- ▶ Ongoing signs of respiratory failure = indication for intubation
- ▶ ETT size = $\text{age in years} / 4 + 4$ (plus one size smaller)
- ▶ ETT depth = ideal tube size for age $\times 3$



Case #2: Respiratory Distress or Failure?

- ▶ **Patient history:** 11 month old with 2-day history of cough and runny nose. Developed fever overnight, this morning parents noted visible change in breathing, called nurse triage line, instructed how to count RR (62) and identified tracheal tugging. Presented to the ER.
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Patient #2 – 11mo bronchiolitis

▶ Anti-pyretics

- ▶ Increases metabolic rate, oxygen consumption, CO₂ production and demands on the cardiac and pulmonary systems
- ▶ Acetaminophen 10-15mg/kg q4-6hours, up to 75mg/kg in 24 hours
- ▶ Ibuprofen 10mg/kg up to 600mg q 6hours
- ▶ Underdosing at home is a common cause of persistent fever despite antipyretic administration



Patient #2 – 11 mo bronchiolitis continued

- ▶ Suction, suction, suction
 - ▶ "Make them Mad"
 - ▶ Don't be afraid to use saline
 - ▶ No clear evidence that deep suctioning may produce better results and may have risks associated with them
 - ▶ Frequent suctioning has been associated with shorter hospitalizations
 - ▶ Educate parents on importance of suction



Patient #2 - 11mo bronchiolitis continued

- ▶ Fluid Resuscitation
 - ▶ Large insensible losses in respiratory illness and this age group
 - ▶ Start with 20ml/kg and then reassess CRT once pt is not febrile
 - ▶ Secretions may seem worse or Chest Xray may look worse with fluid resuscitation
- ▶ Comfort and Reassess
 - ▶ Once all the prior interventions performed, provide food, pacifier, parents, whatever is appropriate
 - ▶ Calm reassessment is important for determining escalation of care
- ▶ Albuterol and racemic epi not generally recommended, but can be trialed once to see if there is improvement in WOB

Case #3: Respiratory Distress or Failure?

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Patient #3 – 4 yo with RAD

- ▶ Early administration of steroids
- ▶ Duoneb
 - ▶ Ipratropium bromide – 2 to 3 doses in combination with albuterol shown to reduce hospitalization in children
- ▶ Albuterol - How to deliver it?
 - ▶ MDI
 - ▶ SVM Nebulizer
 - ▶ Continuous
 - ▶ High Flow NC

Albuterol Dosing for RAD/Asthma

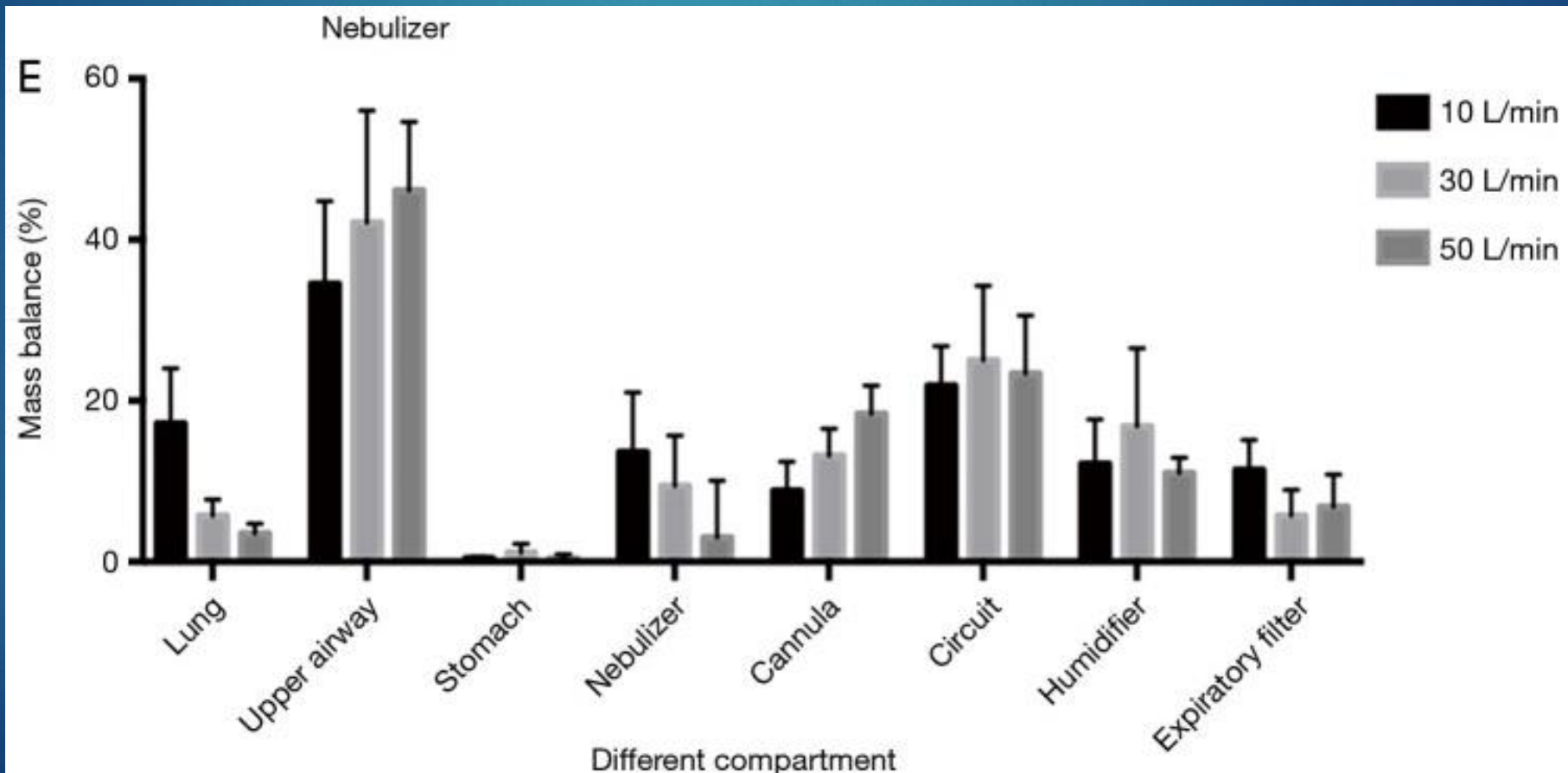
- ▶ For severe respiratory distress, start high and slowly wean down with frequent reassessments.
- ▶ Continuous Albuterol Dosing

Weight	Continuous Neb Dosing
5-10kg	10mg/hr
10-20kg	15mg/hr
Greater than 20kg	20mg/hr

Narrative review of practical aspects of aerosol delivery via high-flow nasal cannula

Jie Li^{1,^} and James B. Fink^{1,2}

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Use of HiFlow NC for the delivery of aerosolized medications

› [Pediatr Pulmonol.](#) 2019 Jun;54(6):914-921. doi: 10.1002/ppul.24274. Epub 2019 Mar 28.

Decrease the flow setting to improve trans-nasal pulmonary aerosol delivery via "high-flow nasal cannula" to infants and toddlers

Jie Li ¹, Lingyue Gong ¹, Arzu Ari ², James B Fink ^{1 3}

Takeaways

- ▶ Maybe less is more
- ▶ In an ideal situation, it would match the peak inspiratory flow
- ▶ The best flow rate for most efficient medication delivery may be 0.25L/kg/min
- ▶ Evaluate the need for flow vs medication delivery
- ▶ If flow and aerosolized medication delivery are both needed, patient may benefit for CPAP or BiPAP support
 - ▶ Ketamine may be beneficial for anxiety related to CPAP/BiPAP initiation

Patient #3 – 4 yo with RAD

Continued

- ▶ Other components of medical management:
 - ▶ Magnesium 25-50 mg/kg (maximum 150 mg/min) x 1 over 15-30 minutes, may repeat x 2 doses up to 2 g total
 - ▶ Terbutaline SQ or IM 10mcg/kg/dose - max 0.4 mg/dose every 15-20 minutes x 3 doses
 - ▶ Epinephrine SQ/IM 0.01 mg/kg 1:1000 maximum 0.5 mg every 20 minutes x 3 doses if refractory to all other methods
 - ▶ Transfer to an ICU nearby
 - ▶ Consider a pediatric specific transport team

Is it wheezy or is it stridor?





Interventions for Croup

Is it wheezy or is it stridor???

Inspiratory stridor is an indication of upper airway

constriction
"Don't make them mad"

Use of Racemic Epi, not albuterol

Steroids

QUESTIONS?

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