Texas Prehospital Pediatric Readiness Education

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Acute Respiratory Diseases in Children

Objectives

- Understand the significance of respiratory disease in the pediatric patient
- Discuss the clinical presentation of the most common respiratory diseases in the pediatric patient
- Review assessment and management of the pediatric patient with respiratory disease

The Pediatric Difference

Special Considerations:

- Hand to mouth behavior increases risk of disease spread
- Inability to “blow their nose” affecting secretion clearance
- Obligate nose breather until approx 6 months
- Smaller airways
- Dependent on adult caregiver choices such as passive smoke exposure

Respiratory Illnesses in Children

Acute URI
Pneumonia
Bronchiolitis
Asthma
Croup
Bronchopulmonary Dysplasia
Cystic Fibrosis

Bronchiolitis: Epidemiology

- Less than 2 yrs old
- Peaks in fall/winter
- Most common cause of hospitalization in young children
- Noninvasive respiratory support (eg HFNC) have reduced need for intubation

Common Causes

RSV
Rhinovirus
Parainfluenza virus
Human metapneumovirus
Influenza virus
Adenovirus
Coronavirus

Bronchiolitis: Clinical Features

- Affects children <2
- URI precedes lower respiratory symptoms
- Peak severity day 3-5

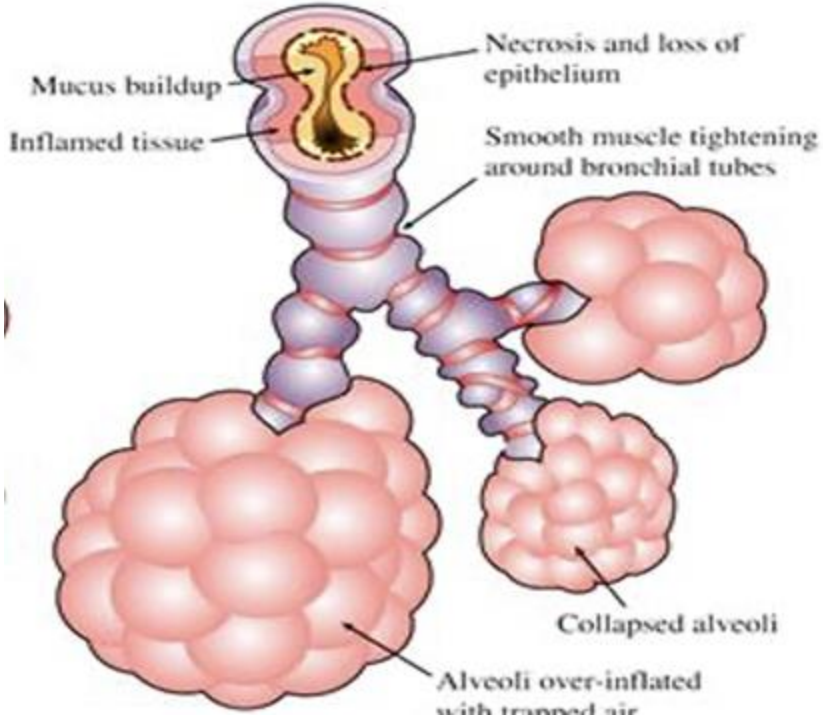
Presentation

Cough
Increased respiratory rate
Retractions
Wheezing and/or crackles
Nasal congestion

	0 Points	1 Points	2 Points	3 Points
Respiratory Rate < 2months 2-12 months 1-2 years		 ≤ 60 ≤ 50 ≤ 40	 61-59 51-59 41-44	 ≥70 ≥60 ≥45
Retractions	None	Subcostal or intercostal	2 of the following: subcostal, intercostal, substernal, or nasal flaring	3 of the following: Subcostal, intercostal, substernal, suprasternal, supraclavicular, or nasal flaring/head bobbing
Dyspnea	Normal feeding, vocalization and activity	1 of the following: difficulty feeding, decreased vocalization, or agitation	2 of the following: difficulty feeding, decreased vocalization, or agitation	Stops feeding, no vocalization, or drowsy and confused
Auscultation	Normal breathing, no wheeze	End-expiratory wheeze only	Expiratory wheeze only (greater than end-expiratory wheeze)	Inspiratory and expiratory wheeze OR diminished breath sounds OR both

Bronchiolitis: Pathogenesis

- Viral infection affecting cells of terminal bronchioles
- Edema, mucous and sloughed epithelial cells obstruct small airways
- Secondary bacterial infection is uncommon



Bronchiolitis: Risk Factors

Congenital

Prematurity
Low birth weight
Age <12 weeks
Hx Bronchopulmonary dysplasia
Abnormal airway anatomy
Heart disease
Neurologic disease

Environmental

Smoke exposure
Crowded household
Daycare
Birth during peak season
Higher altitude
Air pollution

Bronchiolitis: Best Practices

- Assess and address hydration status-Oral route preferred unless severe respiratory distress
- Supplemental Oxygen if desaturation
- Suction and reposition can result in significant improvement
- HFNC for sig distress

therapy in pediatric patients

Age	Body weight	Flow range†	Manufacturer-recommended cannula size	
			Fischer & Paykel‡	Vapotherm
≤ 1 month	< 4 kg	5–8 L/min	S, M	Neonatal, Infant
1 month–1 year	4–10 kg	8–20 L/min	M, L	Pediatric small
1–6 years	10–20 kg	12–25 L/min	L, XL	Pediatric small, Pediatric (Adult small)
6–12 years	20–40 kg	20–30 L/min	XL, Small	Pediatric (Adult small),
12–18 years	> 40 kg	25–50 L/min	Small, Medium	Pediatric (Adult small), Adult

OD, outer diameter.

† Allowed flow range might be different from the manufacturer's recommendations.

‡ XS, S, M, L, and XL in Optiflow™ Junior 2, Small and Medium in Optiflow™ Plus.

Bronchiolitis: Evidence-Based Care

American Academy of Pediatrics **DOES NOT** support routine use of the following:

- Albuterol
- Hypertonic Saline
- Steroids
- Antibiotics

American Academy of Pediatrics **DOES** support:

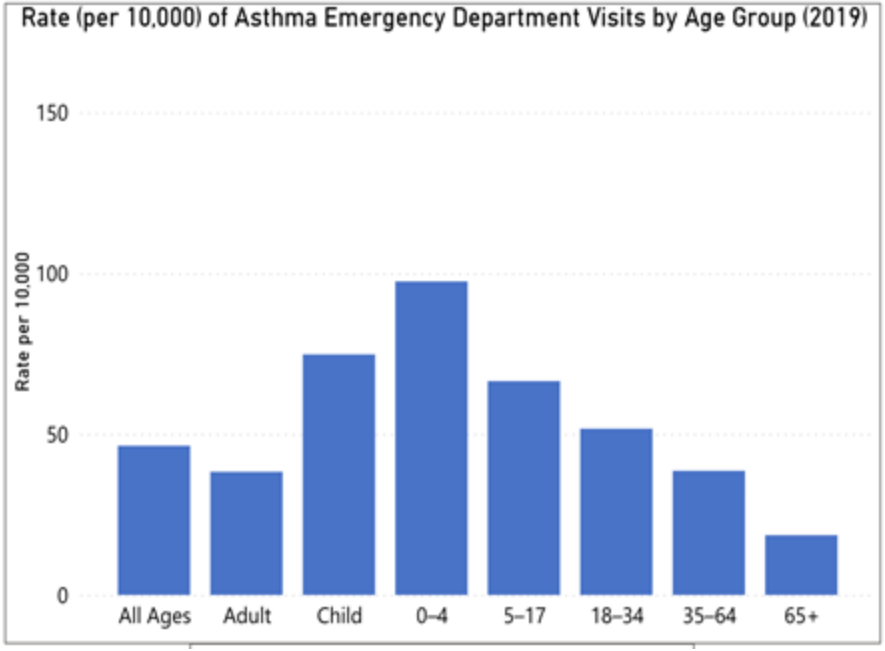
- Supplemental Oxygen to keep sats >90%
- Use of Non-invasive Respiratory Support

Asthma: Epidemiology

- Approx 4.5 million children affected
- Male>Female
- Hispanic and Black children are affected at a disproportionately higher rate than non-Hispanic White children

Asthma: Epidemiology

- 38% of children with asthma will report an annual exacerbation
- 63% will occur in age < 5
- Approx 50% are poorly controlled
- Estimated 1 million annual ED visits
- >14 million missed school days per year



Asthma: Pathogenesis

- Triggering agent/event
  - Viral illness
  - Allergen
  - Cold induced
  - Exercise Induced
- Immune system dysregulation
- Airway inflammation
- Bronchoconstriction

Asthma: Clinical Features

Wheezing
SOB
Cough
Chest Tightness
Tachypnea
Retractions

Agitation/Restlessness
Activity Intolerance
Dec Breath Sounds
Hypoxia
Accessory Muscle Use
Cyanosis

Asthma: Best Practices

- Address Bronchospasm
  - Bronchodilators
- Reduce Airway Inflammation
  - Corticosteroids
- Supplemental Oxygen if needed
  - Sats >90%
- Non-Invasive Respiratory support as needed

Medications for the emergency department management of asthma exacerbations

Medication name	Route	Typical dose	Typical maximum dose
Primary medications			
Albuterol sulfate	HFA	4–8 puffs	
	Nebulized	2.5–5 mg	
	Continuous	5–20 mg/hour	
Ipratropium bromide	HFA	4–8 puffs	
	Nebulized	0.25–0.5 mg	1.5 mg/hour
Dexamethasone	PO, IV, IM	0.6 mg/kg	16 mg
Prednisone	PO	2 mg/kg	60 mg
Prednisolone	PO	2 mg/kg	60 mg

Medications for the emergency department management of asthma exacerbations

Medication name	Route	Typical dose	Typical maximum dose
Secondary medications			
Magnesium sulfate	IV	25–75 mg/kg	2 g
Epinephrine	IV, IM	0.01 mg/kg	1 mg
Terbutaline	SC		250 mcg /dose
		<12 years 10 mcg/kg/dose every 15 minutes for 2 doses	
		>12 years 0.25 mg/dose every 15 minutes for 2 doses	
	IV	2–10 mcg/kg loading dose followed by infusion 0.1–0.4 mcg/kg/min	3 mcg/kg/min
Ketamine	IV	2 mg/kg loading dose followed by 20–60 mcg/kg/min	

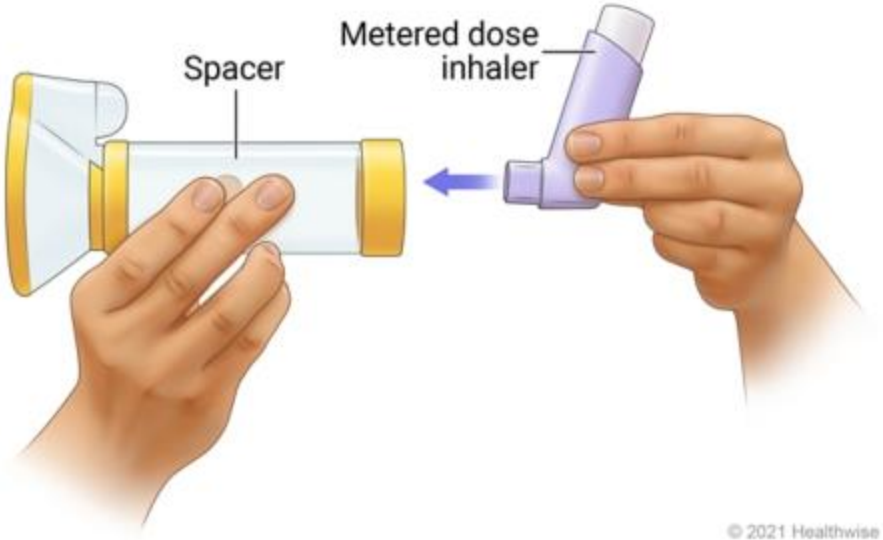
Asthma: Evidence-Based Care

- Goal to reduce obstruction to airflow and improve gas exchange in acute setting
- Can provide “back to back” bronchodilator q 20min x 1 hour
- Ipratropium indicated for significant exacerbation
- Based on severity of presentation and/or response to initial treatment consider:
  - Terbutaline
  - Magnesium Sulfate
  - Non-invasive Respiratory Support
  - Ketamine

PAS component score	0	1	2	3
Respiratory rate				
6 months to 2 years	<30	31–45	46–60	>60
2–3 years	18–26	27–34	35–39	≥40
4–5 years	16–24	25–30	31–35	≥36
6–12 years	14–20	21–26	27–30	≥31
>12 years	12–18	19–23	24–27	≥28
Oxygen saturation	>98% on room air	95–97% on room air	90–94% on room air	<90% on room air or on any oxygen
Auscultation	Normal breath sounds with good aeration throughout	End-expiratory wheezing only	Expiratory wheezing	Inspiratory and expiratory wheezing to diminished breath sounds
Retractions	None	Intercostal	Intercostal and substernal	Intercostal, substernal, and supraclavicular
Dyspnea	Speaks in complete sentences	Speaks in short sentences, coos, and babbles	Speaks in partial sentences, short cry	Speaks in single words; short phrases/grunting

Asthma Classification

	Symptoms		≤5 years of age	>5 years of age	
	Daytime	Nighttime	Exercise tolerance	PEF or FEV1	PEF variability
Mild intermittent	≤2 per week	≤2 per month	Excellent tolerance	≥80%	<20%
Mild persistent	>2 per week, but <1 per day	>2 per month	Exercise symptoms	≥80%	20%-30%
Moderate persistent	Daily symptoms	>1 per week	Frequent exercise symptoms	60%-80%	>30%
Severe persistent	Continual day symptoms	Frequent night symptoms	Exercise severely limited	≤60%	>30%


Spacer
Metered dose inhaler
© 2021 Healthwise


Using a spacer
How to care for your spacer
Asthma + Respiratory FOUNDATION NZ
Child Asthma Action Plan
Name
Better breathing, better living


Well
Worse
Worried
Emergency

Croup: Epidemiology

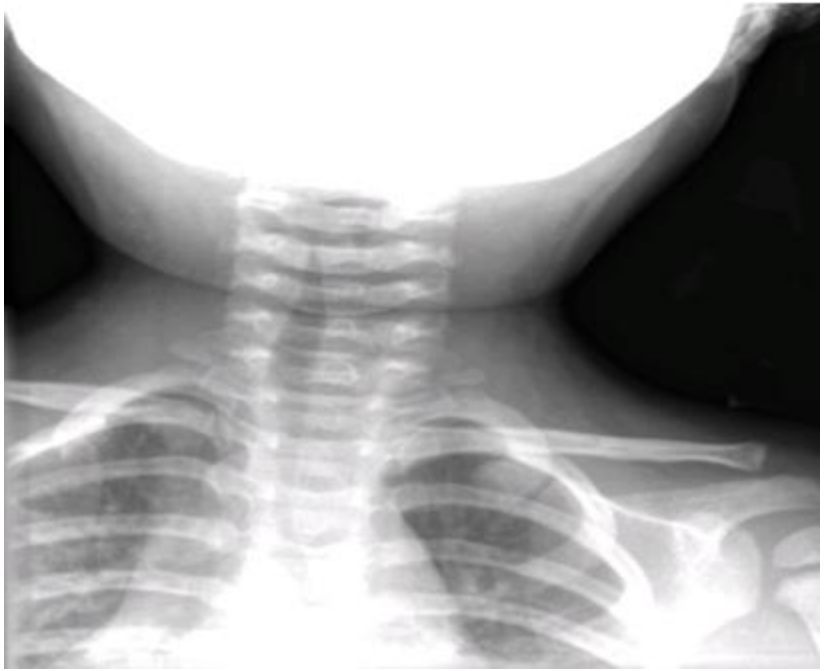
- 6mo-3 yrs
- Fall/early winter
- Incidence 3-5% per year
- Parainfluenza MC viral cause
- Boys > girls
- > 350,000 ED visits per yr

Symptoms

- Rhinorrhea
- Congestion
- Fever
- Hoarse Voice
- Barky Cough
- Stridor
- Retractions

Croup: Pathophysiology

- Viral upper airway infection
- Narrowing of Subglottic airway
- Steeple sign on CXR
- Fixed obstruction at rigid cricothyroid ring
- Dynamic obstruction with crying or agitation



Croup: Best Practices

Mild Croup:

- Barky Cough
- No stridor at rest
- No stridor with agitation
- Normal or mild inc WOB

Treatment:

- Dexamethasone

Croup: Best Practices

Moderate Croup:

- Barky cough
- No stridor at rest
- Stridor with agitation
- Mild inc WOB

Treatment:

- Dexamethasone
- ED observation 4 hours

Croup: Best Practices

Severe Croup:

- Barky cough
- Stridor at rest
- Significant inc WOB

Treatment:

- Dexamethasone
- Racemic Epinephrine 1:1000 5 ml Neb
- ED Observation 4 hours

Croup: Best Practices

- All croup patients receive Dexamethasone
- Racemic Epi nebulized for stridor as indicated
- Oxygen for sats<90%
- Treat fever with Antipyretics
- Avoid painful procedures and keep a calm atmosphere

Croup:Evidence-Based Care

No evidence to support:

- Saline nebs
- Multiple doses of steroid
- Parenteral administration of steroid vs oral

Questions