



# Finding the Zebra: Recurrent Wheezing in a 10-Month-Old Infant

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PEDIATRICS LSU HEALTH SHREVEPORT

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# Disclosure

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- The following authors have documented they have no relevant financial relationships in this CME activity. We have nothing to disclose
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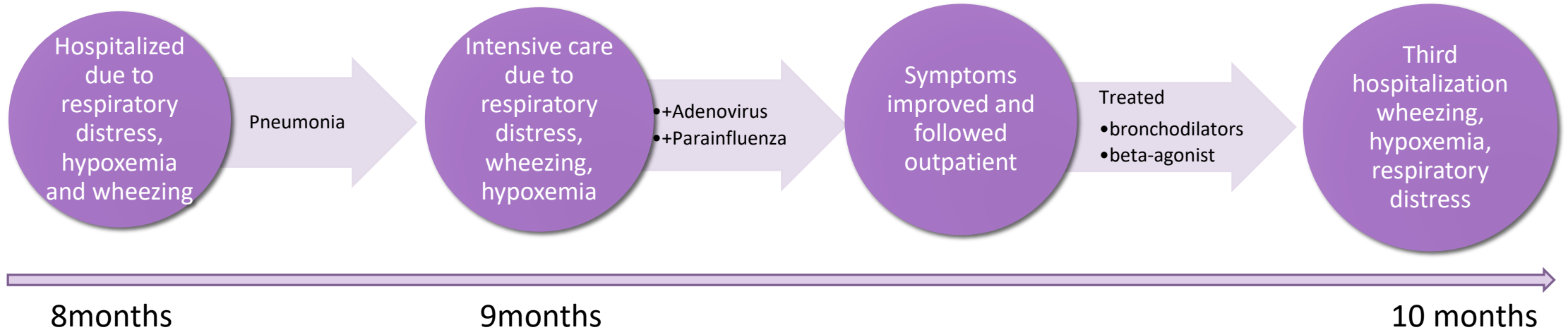
# Objectives

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- Expand perspective on clinical presentation of Post-Infectious Bronchiolitis Obliterans (PIBO)
- Provide a brief overview of PIBO including clinical presentation, review of pathophysiology, and the importance of diagnosing PIBO
- Discuss treatment options for PIBO

# Case Presentation: History

- **Chief Complaint:** Recurrent wheezing
- **Past Medical History:** He was born full term and the prenatal history was otherwise unremarkable.
- **History of Present Illness:**



# Case Presentation: History

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- **Review of systems:**

- Negative for: stridor, failure to thrive, coughing/choking while feeding, stool abnormalities, eczema, or parental asthma.

- **Physical examination:**

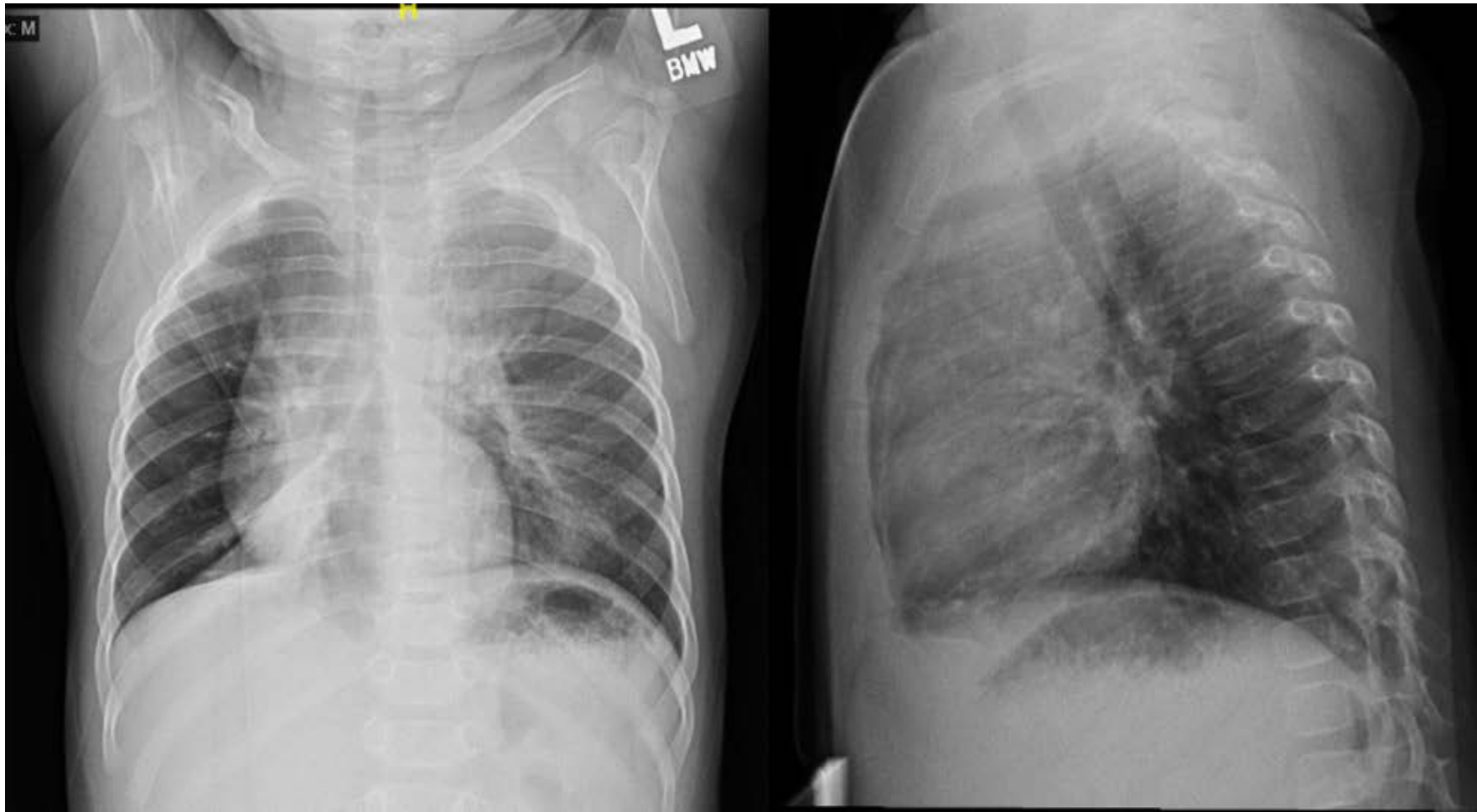
- Infant was hypoxic (oxygen saturation 88% on room air), tachypneic with intercostal retractions, had diffuse expiratory wheezing and crackles.

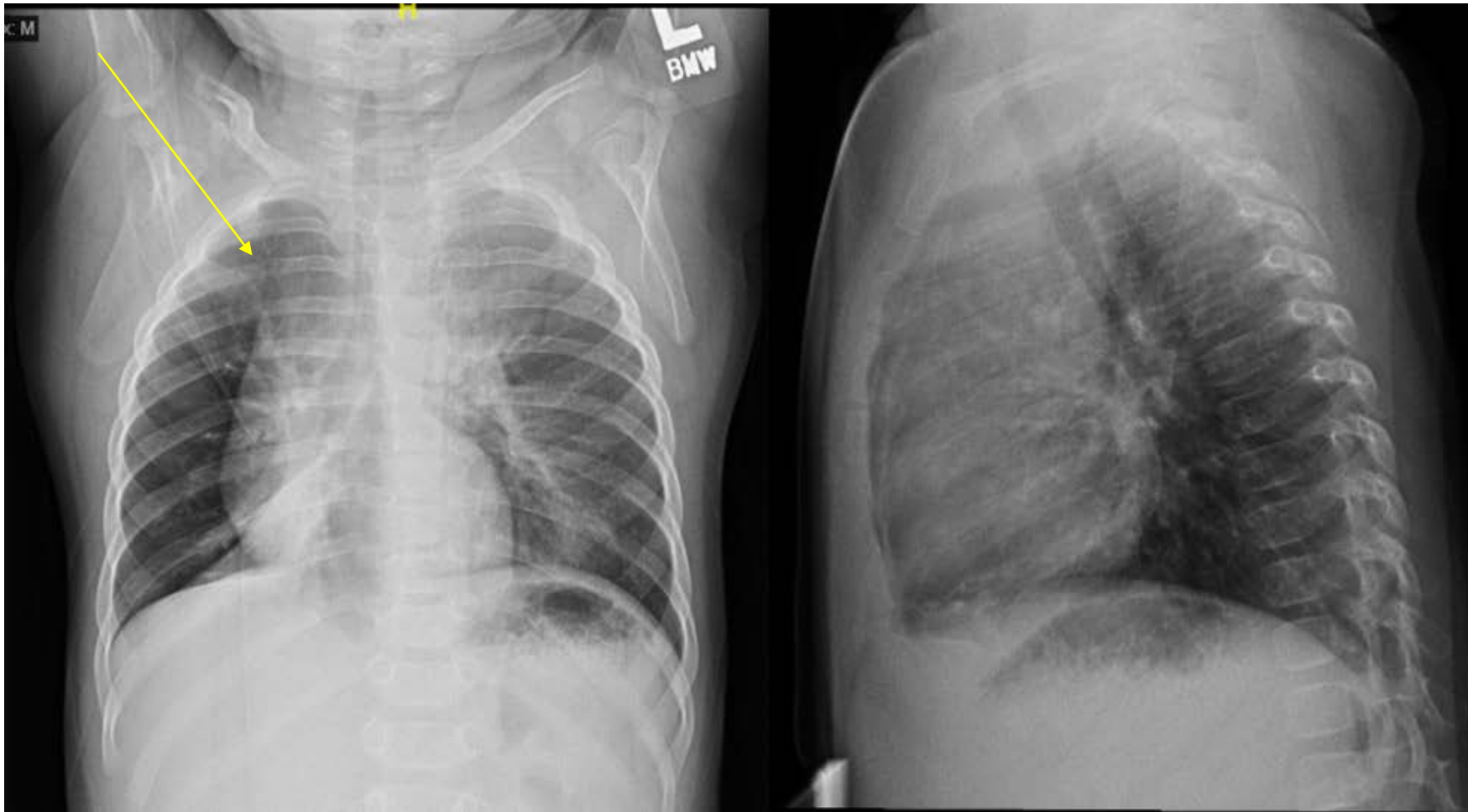
- Due to respiratory distress and hypoxemia he was hospitalized for further evaluation.

# Case Presentation: Work up

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- The cardiac evaluation was unremarkable, without murmurs or gallops, and an echocardiogram was normal.
- Labs:
  - A sweat chloride test, serum quantitative immunoglobulin assay and genetic testing were negative
- Imaging:
  - A chest radiograph obtained
  - CT angiography of the chest obtained to rule out vascular abnormalities





***Image 1*** Chest X-ray AP and lateral view demonstrating right upper lobe atelectasis, right lower lobe collapse and perihilar infiltrates.

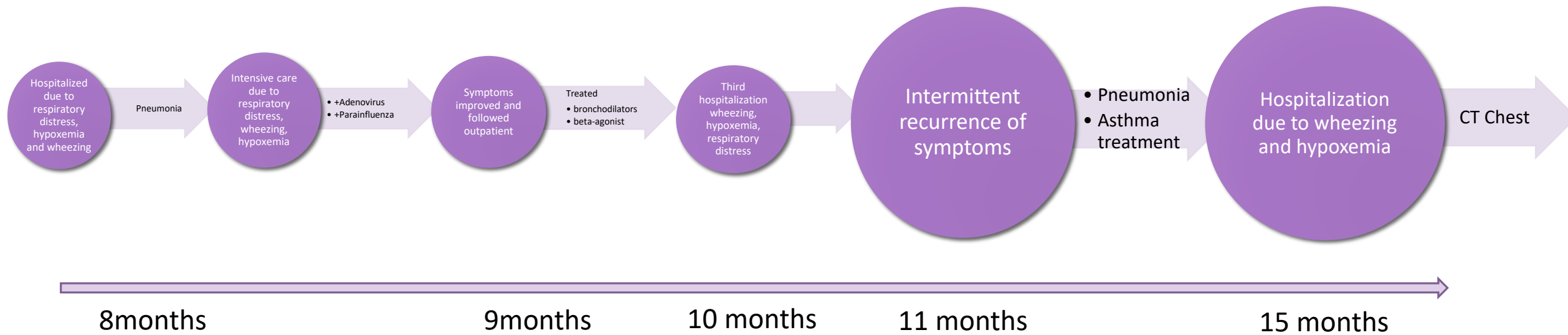


# Case Presentation: Treatment

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- Bronchoscopy revealed normal upper and lower airway anatomy. Broncho-alveolar lavage fluid culture was positive for *Haemophilus influenzae*.
- Inpatient Treatment
  - Intravenous and oral antibiotics
  - Steroids (oral)
  - Bronchodilators.
- Patient continued to use daily inhaled steroids and bronchodilators as needed.

# Case Presentation: Follow-up







**Image 2:** CT of Chest showing air trapping, bronchiectasis and mosaic pattern

# Case Presentation: Differential Diagnosis Of Recurrent Wheezing

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- Asthma
- Viral infection
  - Bronchiolitis
- Cystic Fibrosis
- Ciliary Dyskinesia
- Congenital Pulmonary Airway Malformation
- Vascular Ring
- Bronchogenic Cyst
- Bronchiolitis Obliterans

# Case Presentation: Hospital Course

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- Diagnosis of PIBO was made
- Treatment:
  - Pulse methylprednisolone
  - Oral azithromycin
  - An airway clearance plan
- Follow up:
  - After three rounds of pulse steroids significant clinical improvement was noted
  - At his most recent evaluation, the patient had no respiratory distress, tachypnea or retractions



# Post-Infectious Bronchiolitis Obliterans (PIBO)

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# Bronchiolitis obliterans (BO): Overview

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- Bronchiolitis obliterans (BO) is a rare cause of chronic obstructive lung disease occurring after a severe insult to the lower airway tracts.
  - The pathophysiology of BO involves chronic inflammation of bronchiolar epithelial and subepithelial cells leading to scarring, narrowing and fibrosis of bronchioles.
  - These changes lead to air trapping, bronchiectasis and atelectasis.
- Causes:
  - BO can be caused by various etiologies including infections, post solid organ or bone marrow transplant or exposure to toxic fumes.
  - In children, the most common form of BO is post-infection BO (PIBO) which typically occurs after viral or bacterial infection.



# PIBO: Overview

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- PIBO is considered to be an irreversible airway obstruction.
- In children, PIBO has been strongly linked with adenovirus and *M. pneumoniae* infections.
- Despite the impact and high association with common viral infections diagnosis of PIBO remains rare and thought to be due to the limited awareness.
- The clinical manifestations which include recurrent wheezing and coughing are very common in children and contributes misdiagnosis and mistreatment



# PIBO: Diagnosis

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- The diagnosis of PIBO suggested by:
  - Clinical
  - Radiographic findings
  - Ruling out other causes of lung disease
- Multiple studies have shown the use of high resolution computer tomography is superior in making diagnosis
- Pulmonary function test and lung perfusion status may aid in determination of severity and follow up course. Pulmonary function testing typically reveal fixed lower airway obstruction and marked decrease of FEF25-75%.
- Open pulmonary biopsy, although considered the gold standard, is generally not required for diagnosis when classical findings are present but can be performed when deterioration even after treatment <sup>3</sup>.
- **Patients should also undergo complete evaluation with laboratory testing to evaluate for other causes.**



# PIBO: Treatment

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- Definitive treatment for PIBO is unknown.
- A recent study by Castro-Rodriguez et al. evaluated symptoms and treatment in 42 children with PIBO concluded that systemic steroids along with oral azithromycin may be beneficial <sup>3,5</sup>.
- Systemic steroids have shown to decrease wall thickening and air trapping in patients with PIBO.
- Supportive care including removal of offending agents i.e smoking, allergens, inhaled irritants should also be done regardless of severity of PIBO.
- Bronchodilators can be use if patient has positive response.
- Lung transplantation is the final option in children with BO and indicated by severe disease with extremely impaired pulmonary function tests and oxygen dependency



# PIBO: Prognosis

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- Prognosis is linked with response to treatment and is associated with clinical severity and radiologic findings.
- Overall, PIBO has high morbidity, they have recurrent respiratory exacerbations that require frequent hospitalizations<sup>4,10</sup>.
- **A multidisciplinary approach is recommended due to complexity and ongoing care of this disease**

# Conclusion

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- Wheezing in infants is very common
- Post-infectious bronchiolitis obliterans is a rare cause of chronic obstructive pulmonary disease that develops after severe insult to lower airways and typically seen after adenovirus infection in the pediatric population.
- Early identification of PIBO and timely treatment is important to limit progression of bronchiectasis and permanent lung damage.



# Take Home Points

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- Not all wheezing is asthma
- Clinicians should have high suspicion when wheezing does not respond to standard treatment and should keep in mind uncommon causes (Zebras)

Thank you!  
Questions?



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