

Sputum! Sputum! Sputum!

Is it Bronchiectasis?

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Disclosure

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- *Electromed, speaker*
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Objectives

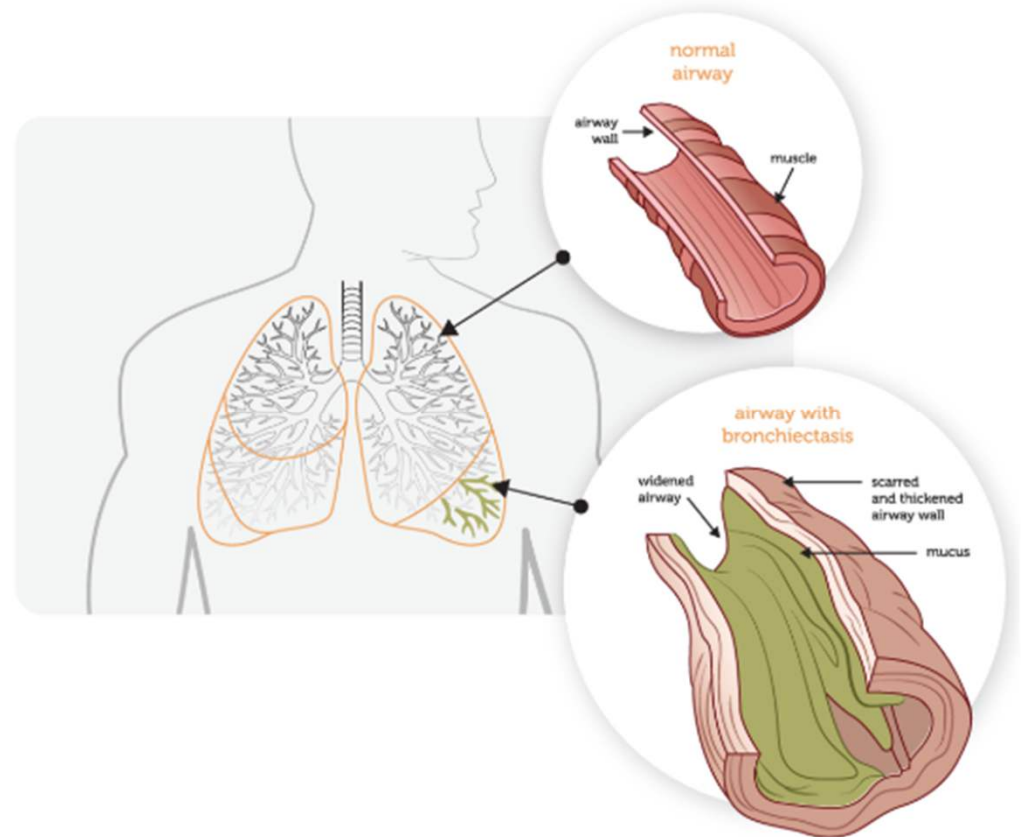
- Bronchiectasis
 - Review disease, history, prevalence, causes, symptoms, and diagnosis
- Sputum
 - Discuss sputum properties in the bronchiectasis patient population
- Management
 - Discuss bronchiectasis treatment options and airway clearance modalities
- Patient Education
 - Review the importance of airway clearance education for successful patient outcomes

Bronchiectasis

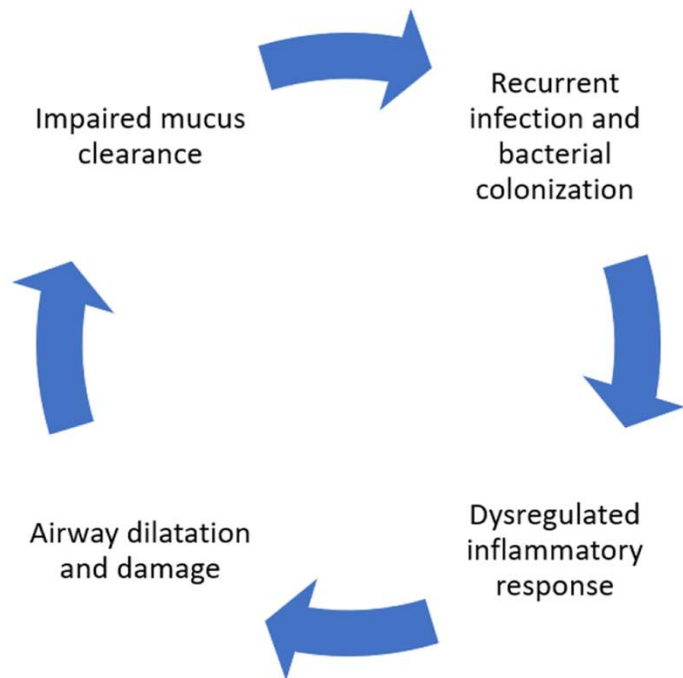
Abnormal widening of the airways

- *Bronckos* – airway
- *Ectasis* – widening

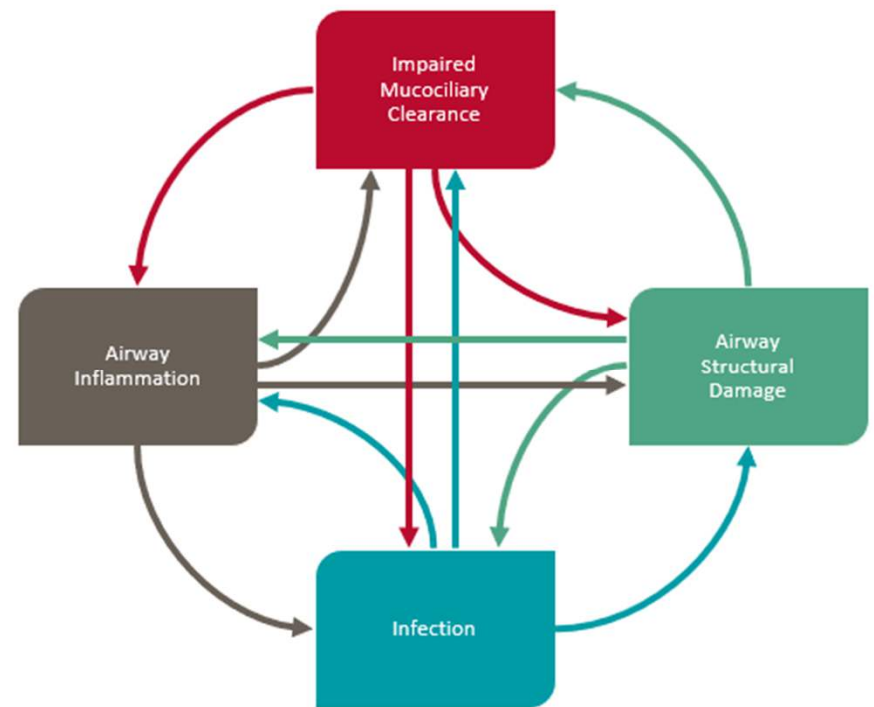
Damaged airways impairs bronchial drainage



Vicious Cycle



Vicious Vortex



The arc of history...

1916



2020



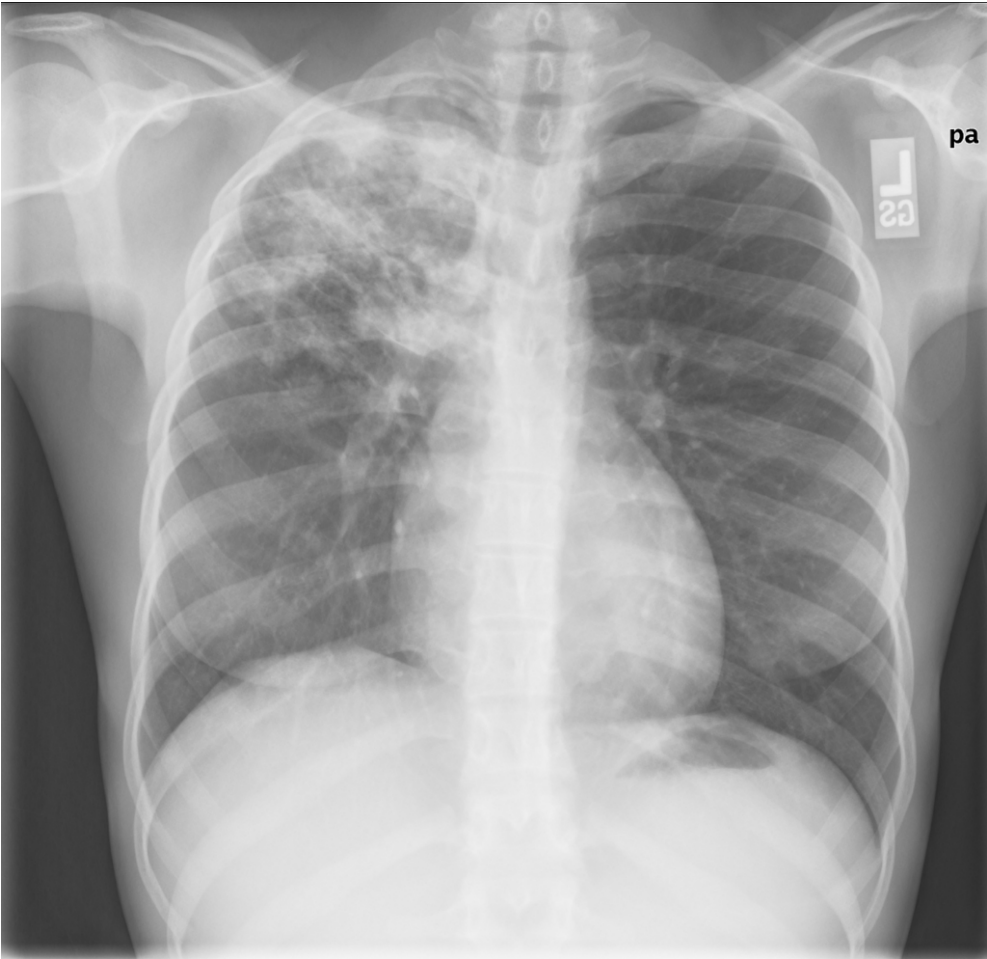
And soonest our best (lungs) with thee do go...

Tuberculosis

- Sanatorium
- Forced supine rest
- Race against time prior to development of antibiotic therapy

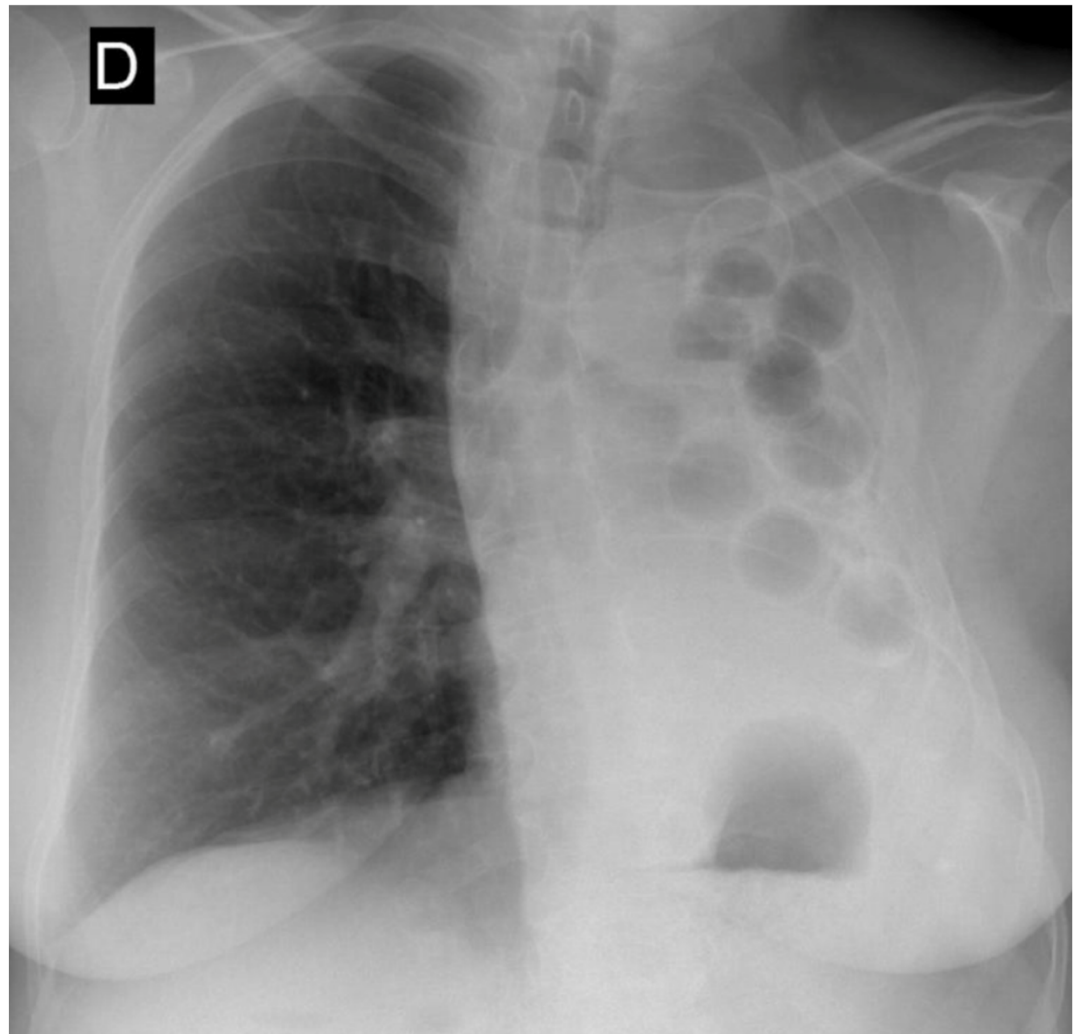


Tuberculosis



Gaillard F, Silverstone L, Walizai T, et al. Tuberculosis (pulmonary manifestations). Reference article, Radiopaedia.org (Accessed on 19 Aug 2025) <https://doi.org/10.53347/rID-8631>
John F. Murray; Dean E. Schraufnagel; Philip C. Hopewell; *Annals ATS* 121749-1759. DOI: 10.1513/AnnalsATS.201509-632PS

RELICS OF HEALING/MISERY



Airway Destruction (*bronchiectasis*)

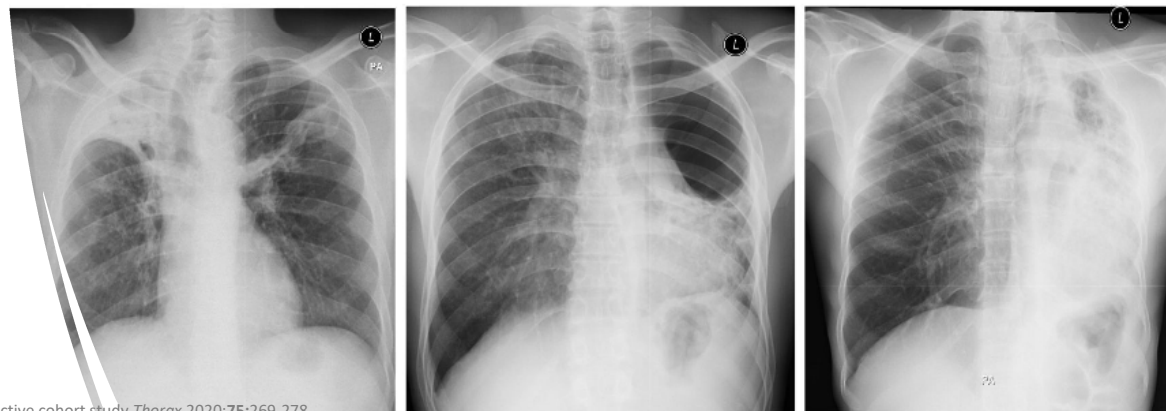
Panel 1: Bronchiectasis (HRCT)



Panel 2: Destroyed lung (HRCT)

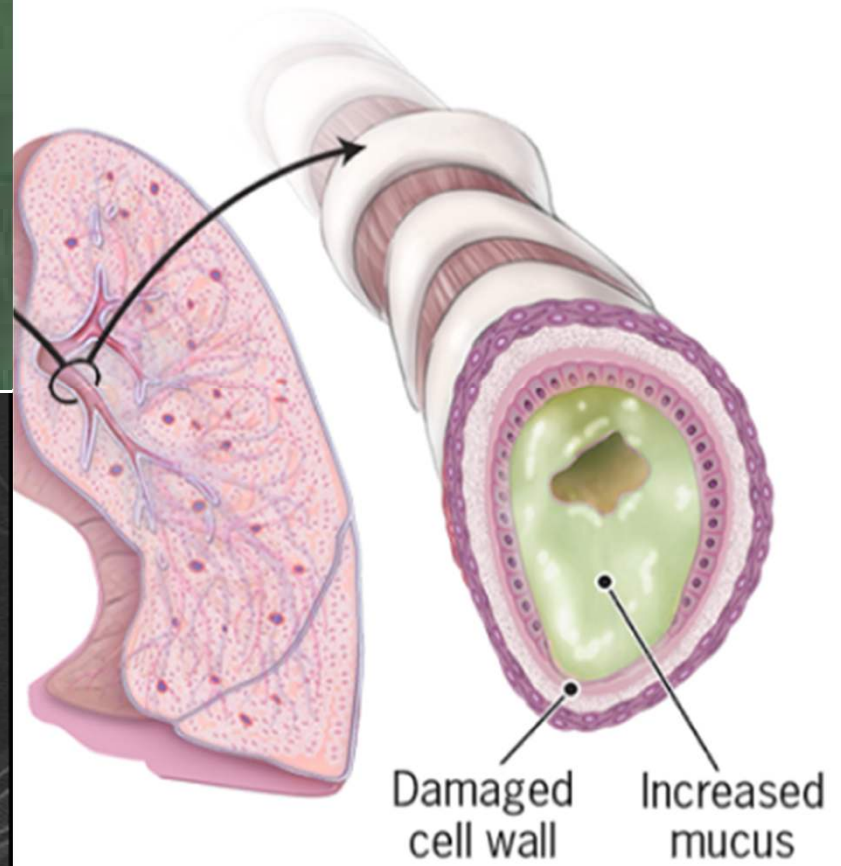


Panel 3: Destroyed lung (Chest X-ray)





Bronchiectasis



Airway Clearance

1901: Began using postural drainage in children with recurrent pulmonary infection.

Postural drainage with chest clapping remained gold standard until 1960s.



Pediatric VENTALUNG has exactly the same features as adult model, but expressly designed for therapy with children.

VENTALUNG with Auto-cycler, an accessory, is automatic for use on a post-operative patient unable to breathe spontaneously.

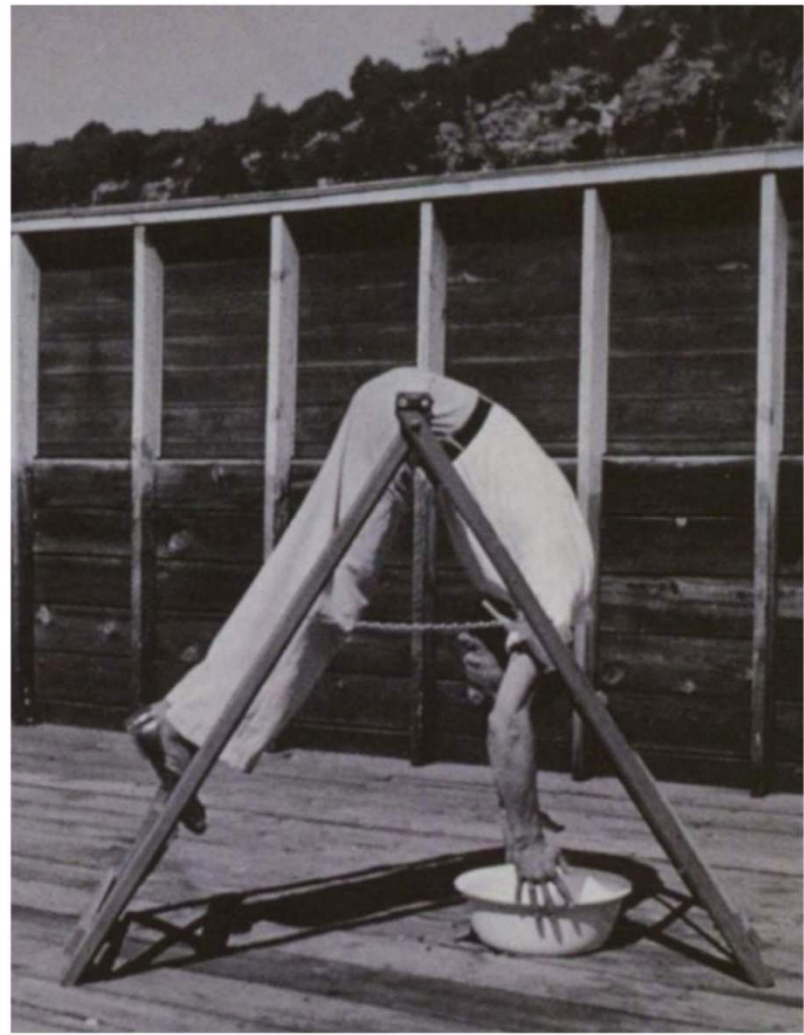
VENTALUNG

TRADEMARK

for adults... for children...

Two separate models provide *intermittent positive pressure breathing* wherever it is needed—where dyspnea, chronic loss of pulmonary function, inadequate ventilation or apneic conditions are present. They can be used with cylinder oxygen or piped oxygen systems and the treatment administered through face masks, mouthpieces or tracheostomies, either with continuous or intermittent nebulization.

And now, the first I.P.P.B. breathing apparatus designed for therapy of children, the Monaghan Pediatric VENTALUNG makes therapy fun. Having exactly the same features as the adult model, even children who have been afraid of therapy devices can be coaxed into using the Pediatric Ventalung. With a face like a friendly clown, and an eye that rolls, it helps dispel fear as it supplies life-giving oxygen.





Airway Clearance

McMahon, 1915, proposes deep breathing and exercise as necessary for improvement in soldiers with thoracic injury.

“A very large experience of chest cases” had shown **“how very important it is that** where there is serious lung collapse and chest deformity, **following wounds or illness, breathing and physical exercises should be given as accessories to medical and surgical treatment,** if the best possible recovery is to be assured.”



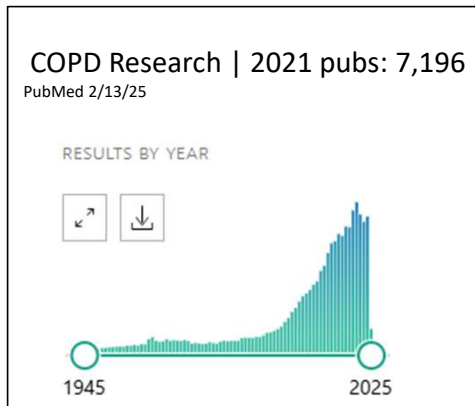
And dost with poison, war, and sickness dwell...

1562: *The Triumph of Death* by Pieter Bruegel the Elder

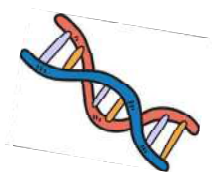
<https://www.museodelprado.es/en/the-collection/art-work/the-triumph-of-death/d3d82b0b-9bf2-4082-ab04-66ed53196ccc>

Bronchiectasis Prevalence

- More common in women (66%) than men
- 29 cases per 100,000 U.S. adults annually
- Actual prevalence is likely greater due to lack of universal screening



Bronchiectasis Causes



- Cystic fibrosis
- Primary ciliary dyskinesia



- Post-infective
- NTM
- HIV



- Lupus
- Rheumatoid arthritis
- Connective tissue disease



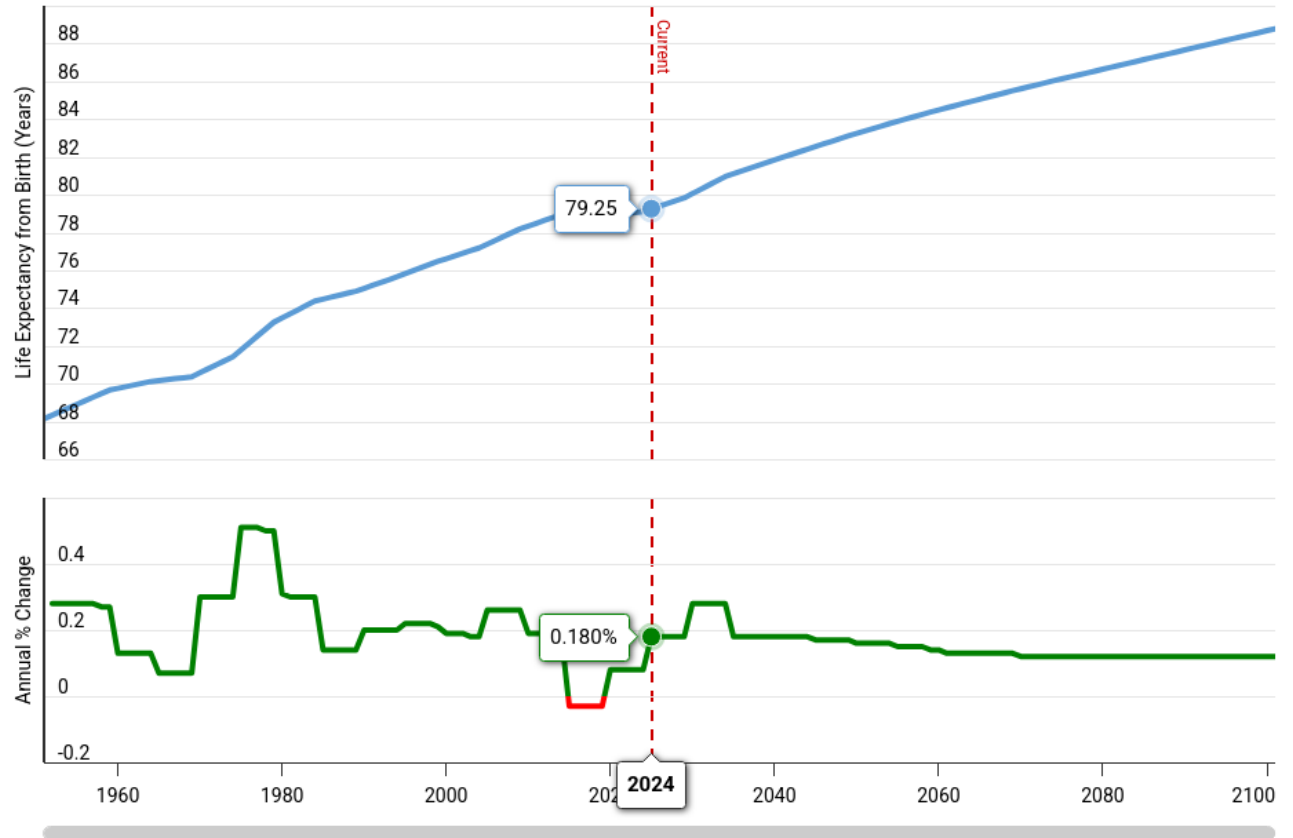
- Crohn's
- IBD
- Ulcerative colitis
- GERD
- Aspiration



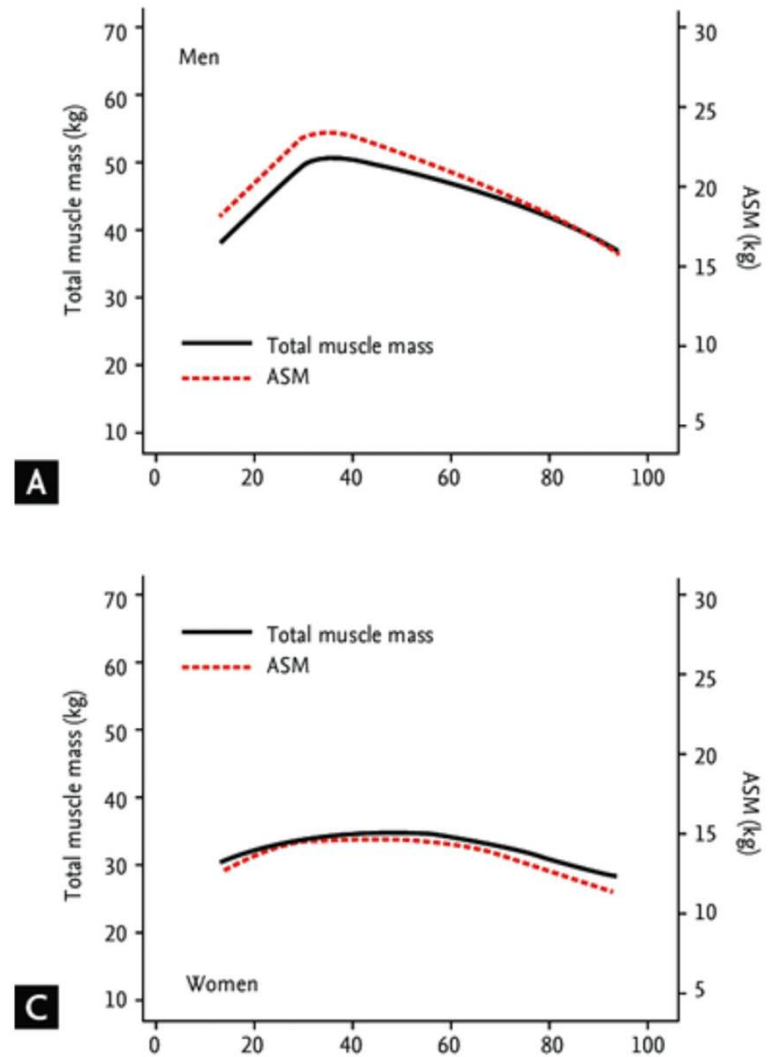
- COPD
- Asthma
- ILD
- ABPA

~50% idiopathic

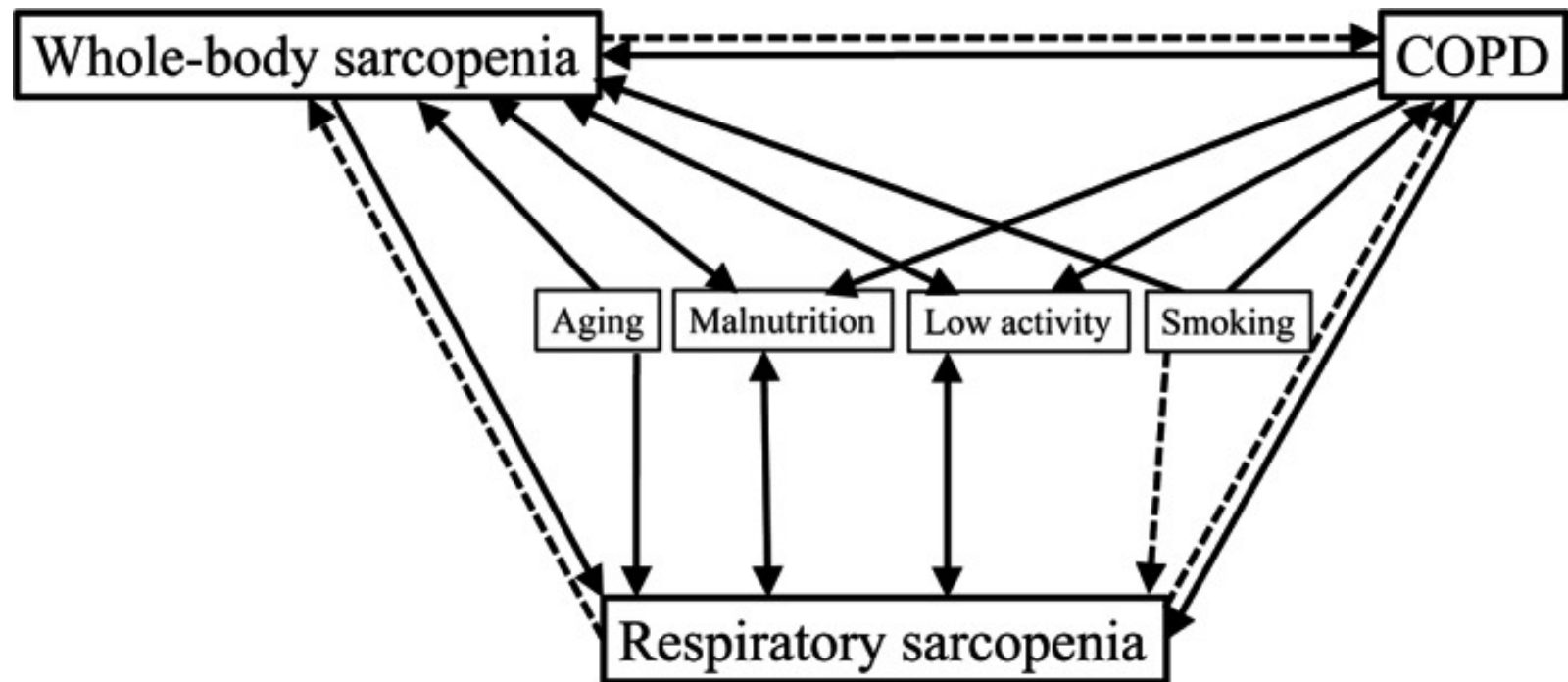
The common enemy of time



Normal loss of muscle mass over time/with aging



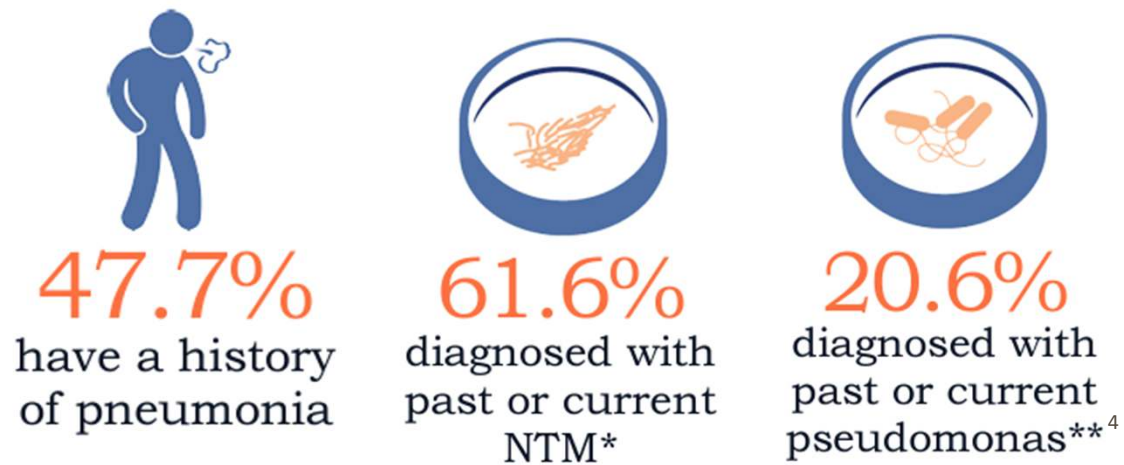
Respiratory Sarcopenia



Bronchiectasis Symptoms

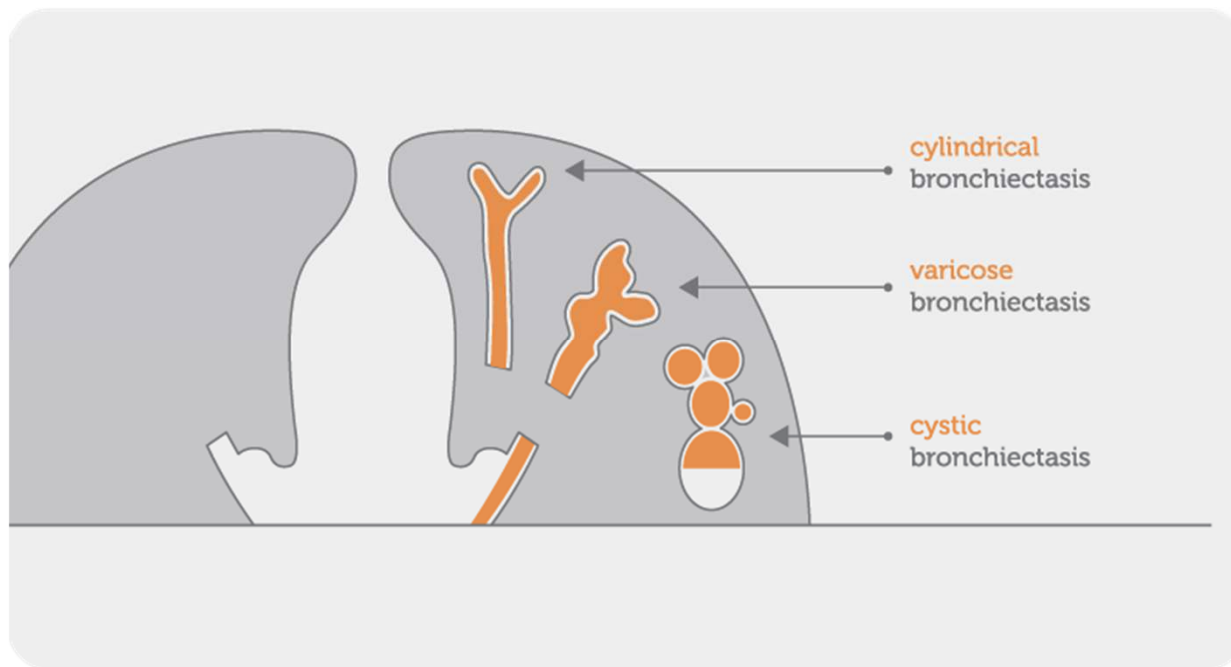
- Chronic cough, productive
- Hemoptysis
- Recurrent pulmonary infections
- Fatigue
- Wheezing

Bronchiectasis & NTM 2024 Registry Data



* Defined by one or more positive culture -or- by physician diagnosis
** Defined by one or more positive culture

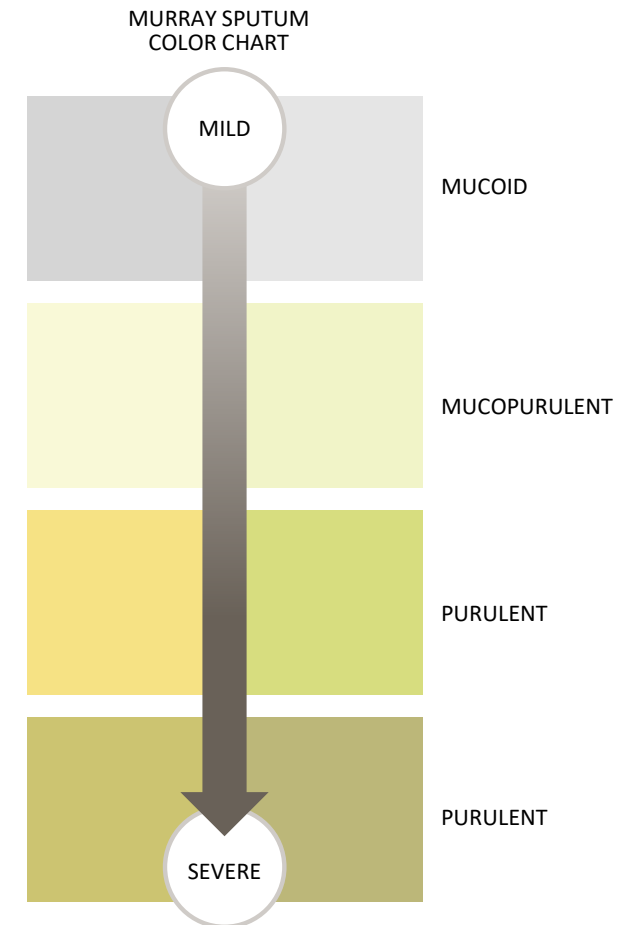
Bronchiectasis Diagnosis



- **HRCT** is gold standard for diagnosis
- Other testing:
 - Sweat test
 - Sputum
 - Blood
 - PFT
 - Genetic

SPUTUM!

- Sputum color is associated with disease severity
 - Purulent sputum is associated with increased exacerbations
 - Purulent sputum is associated with a greater risk of hospitalization and mortality
- Mucus plugging is common symptomatic patients
 - Airway clearance therapy has proven to decrease plugging on HRCT
 - Airway clearance therapy has proven to decrease symptom burden



Management

Frailty

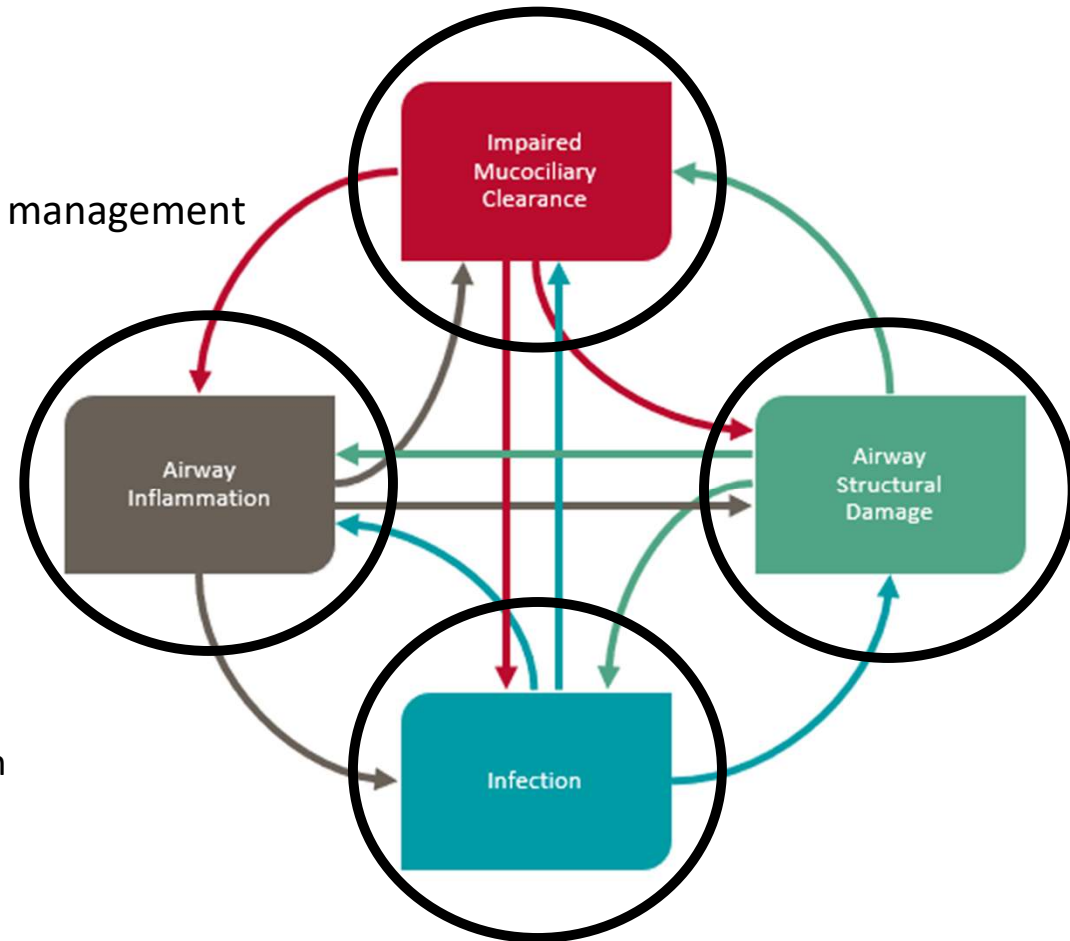
- Individuals with weakness
- Difficulty standing from seated position
- Weak grip strength
- Age over 65
- Underweight
- Hospitalization for any cause in the past year
- Recurrent respiratory infections

Arsenal

- Nutrition consult
- SLP consult to eval for aspiration
- Exercise, exercise, exercise
- Flutter valve
- Incentive spirometry
- HFCWO (high frequency chest wall oscillation)

Bronchiectasis Treatment

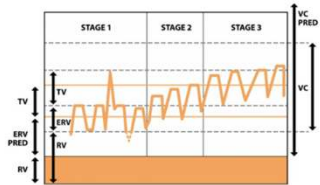
- **Airway clearance** is a mainstay of bronchiectasis management
 - ~ 50% of patients use non-pharmacological ACT
- **Pulmonary rehab**
 - Surgery for severe cases
- **Antibiotics** for infections
 - Rule out NTM first
- **Anti-inflammation**
 - Anti-inflammatory Rx for neutrophilic inflammation



Airway Clearance

Breathing Techniques

- Huff cough
- Active cycle of breathing
- Autogenic drainage



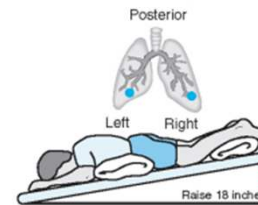
Medications

- Hypertonic saline
- Acetylcysteine



Manual

- Chest percussion
- Postural drainage
- Exercise

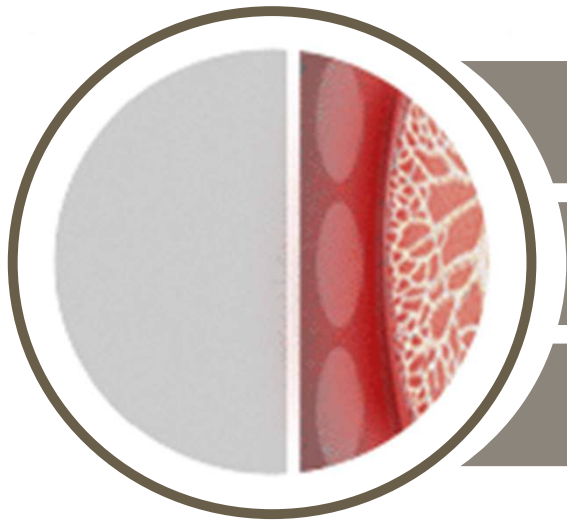


Devices

- OPEP/PEP
- OLE
- HFCWO



High Frequency Chest Wall Oscillation



Forces produced by HFCWO ripple across retained secretions to **SHEER** mucus away from the walls of the airway.

This consistent force reduces the viscosity of the secretions, to make them **THIN**.

PROPEL the mucus up towards the large airway where it can be expectorated or suctioned more easily.

Generator produces an alternating flow of air into the garment that rapidly compresses and releases the chest wall at a variety of frequencies and pressures.

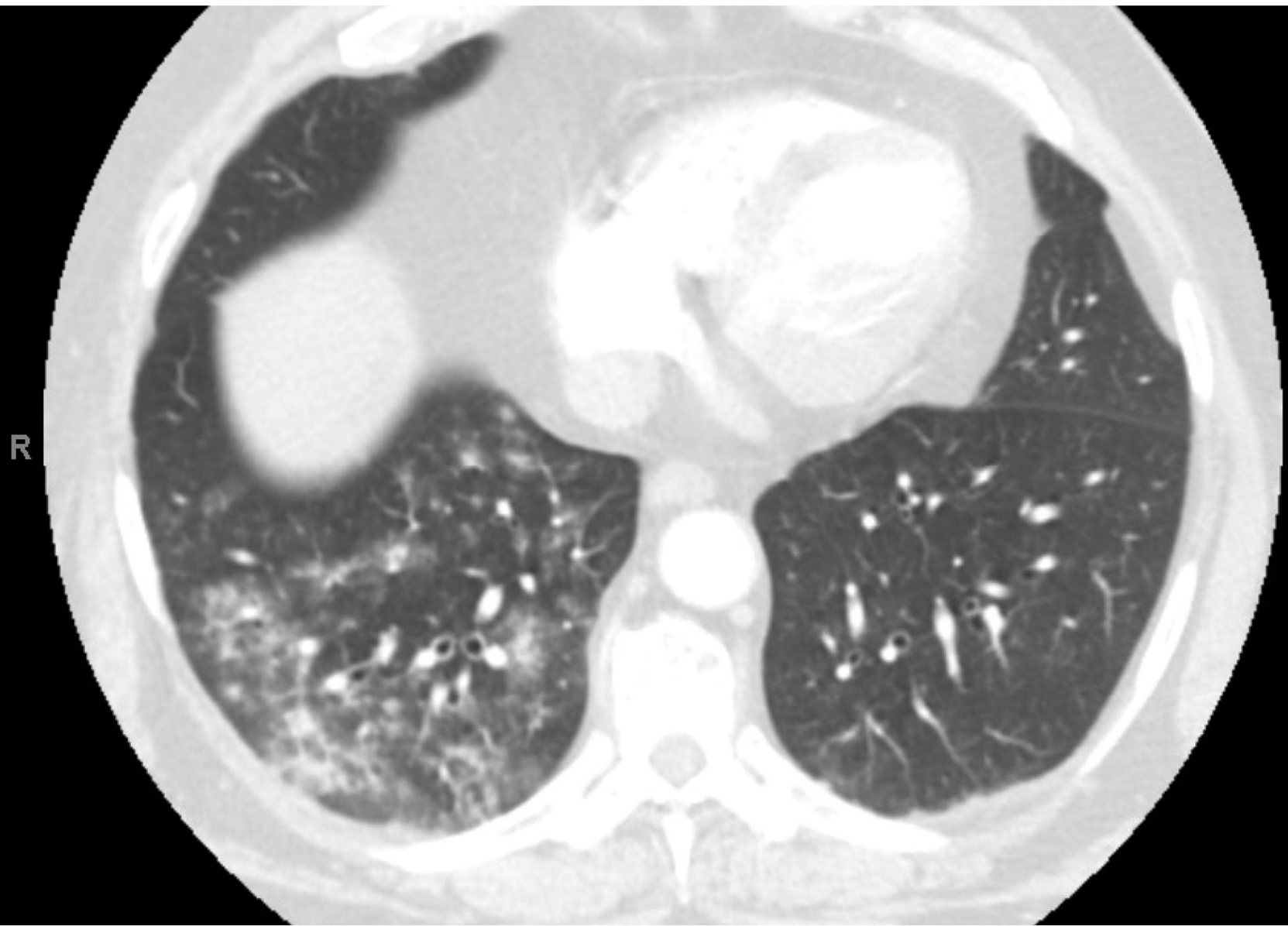
57% Reduction
in antibiotic
prescriptions¹

59% Decrease
in hospitalizations¹

60% Fewer
in emergency
department visits¹

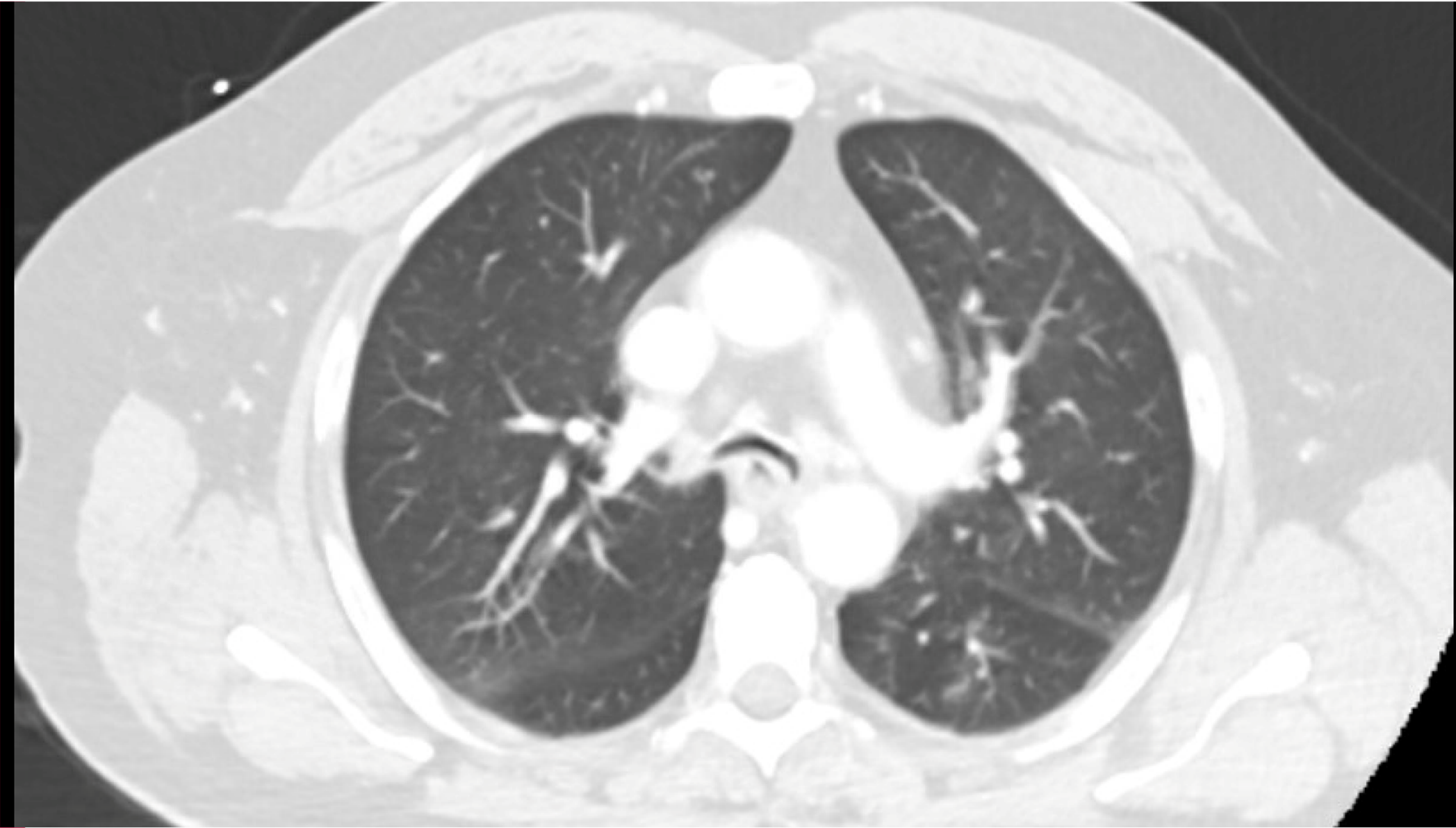
Case Presentation

- 68-year-old gentleman remote smoker admitted with recurrent pneumonia.
- Reviewing extensive chest imaging, documentation, lab values I am in agreement with primary team and prior pulmonary consultation that the patient is suffering from intermittent aspiration. I do note that SLP exam states no evidence of aspiration. I agree with this. I do not think the patient is suffering from dysphagia but rather from chronic intermittent gastric acid aspiration.
- Patient has evidence of patulous fluid-filled esophagus and classic symptoms of gastric acid regurgitation. I think this is likely resulting in intermittent gastric acid aspiration.
- In the differential diagnosis would be resistant organism. Additionally, patient does have evidence of tracheomalacia on CT chest.
- To further evaluate tracheomalacia and to rule out resistant organism I will perform bronchoscopy tomorrow.

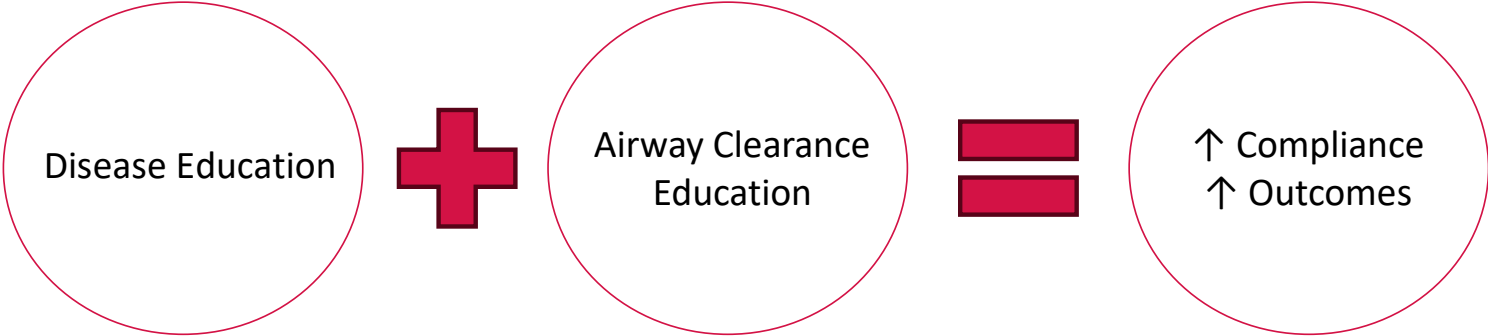


R





Patient Education



Summary

- Bronchiectasis likely has greater prevalence than what is currently diagnosed
 - Dig deeper for bronchiectasis
- Sputum and mucus plugging are telling in bronchiectasis patients
 - Move the mucus
- Education on disease state and airway clearance may lead to improved compliance
 - Understanding the link of pulmonary hygiene and reduction in lung infections makes it “click”; it’s like brushing your teeth





Thank you! Questions?