



# INNOVATIVE AIRWAY CLEARANCE STRATEGIES :EXPLORING PEEP- ZEEP MANEUVER

Presented by :-

**Amal Rabea Mansour**  
ICU Head Nurse ,Master  
degree of Nursing  
Administration,PHD  
Candidates



16<sup>th</sup> & 17<sup>th</sup> April 2025



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## Case Scenario :-

A 63-year-old male patient with a history of chronic obstructive pulmonary disease (COPD) and heavy smoking **is admitted to the ICU with acute respiratory failure.**

Patient Presentation:

- **Increased secretions:** Thick, yellowish sputum.
- **Impaired gas exchange:**  $\text{PaO}_2/\text{FiO}_2$  ratio  $< 200$ .
- **Respiratory distress:** Tachypnea and use of accessory muscles.





## Interventions:

The patient **is intubated & mechanical ventilation due to airway obstruction** undergoes **aerosol therapy**, followed by calling physiotherapy to begin percussion and other techniques to mobilize secretion. **The PEEP-ZEEP maneuver** is then performed to help clear secretions from the airway. This treatment is performed twice daily for 10-15 minutes.





## Outcomes:

After 3 days of treatment, the patient shows:

- . **Improved oxygenation:** Increased PaO<sub>2</sub>/FiO<sub>2</sub> ratio.
- . **Reduced secretions:** Decreased amount and thickness of sputum.
- . **Weaning from mechanical ventilation:** Successful extubation.







## INTRODUCTION

In the dynamic environment of critical care, where every breath counts, the effectiveness of mechanical ventilation often determines patient outcomes. **Clinical studies report that nearly 30% of mechanically ventilated patients experience oxygen desaturation due to alveolar collapse (atelectasis) and secretion retention.** This highlights the clinical importance of the PEEP-ZEEP maneuver — a simple yet powerful ventilatory technique that recruits collapsed alveoli and enhances



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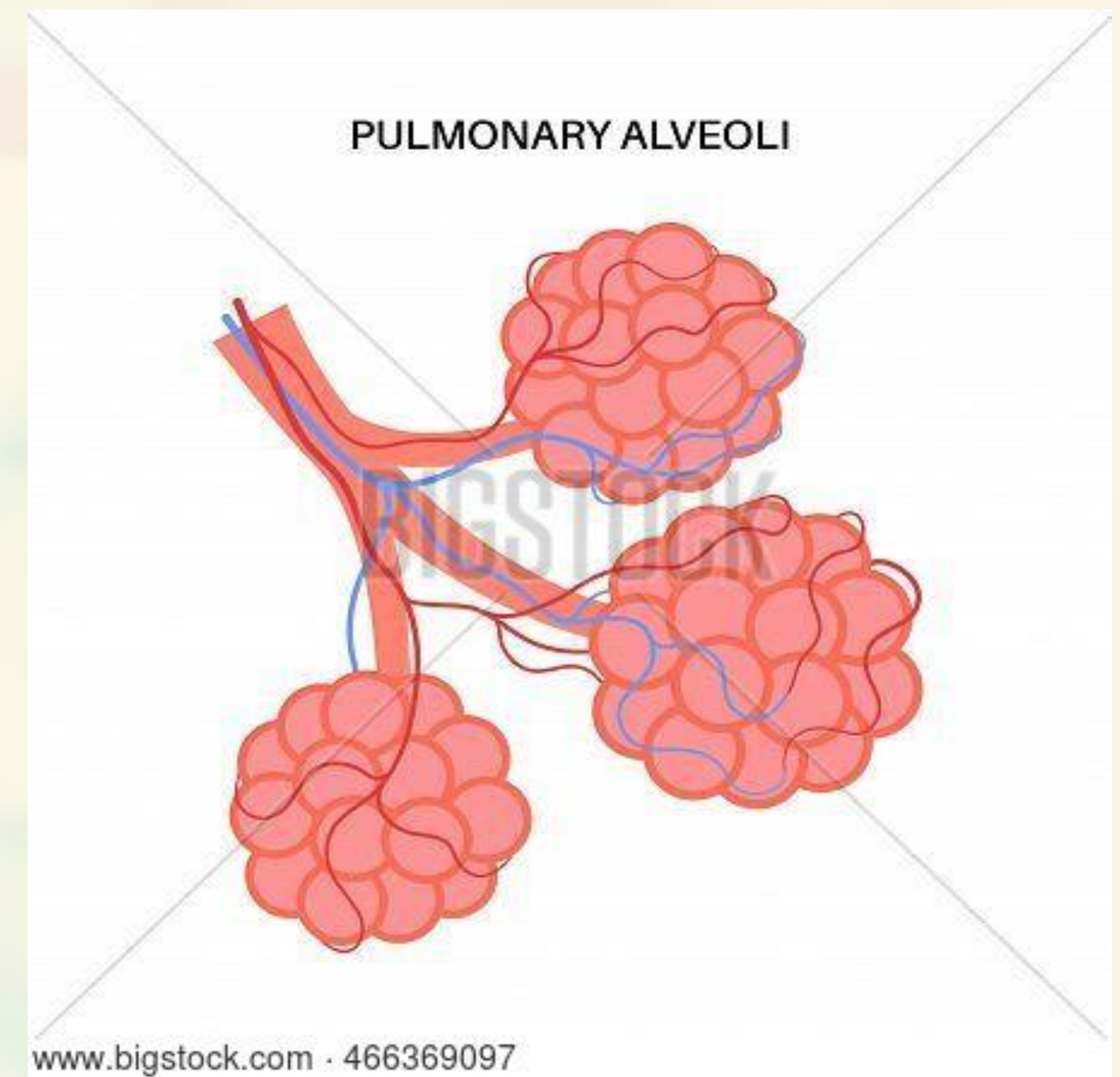






## DEFINATION

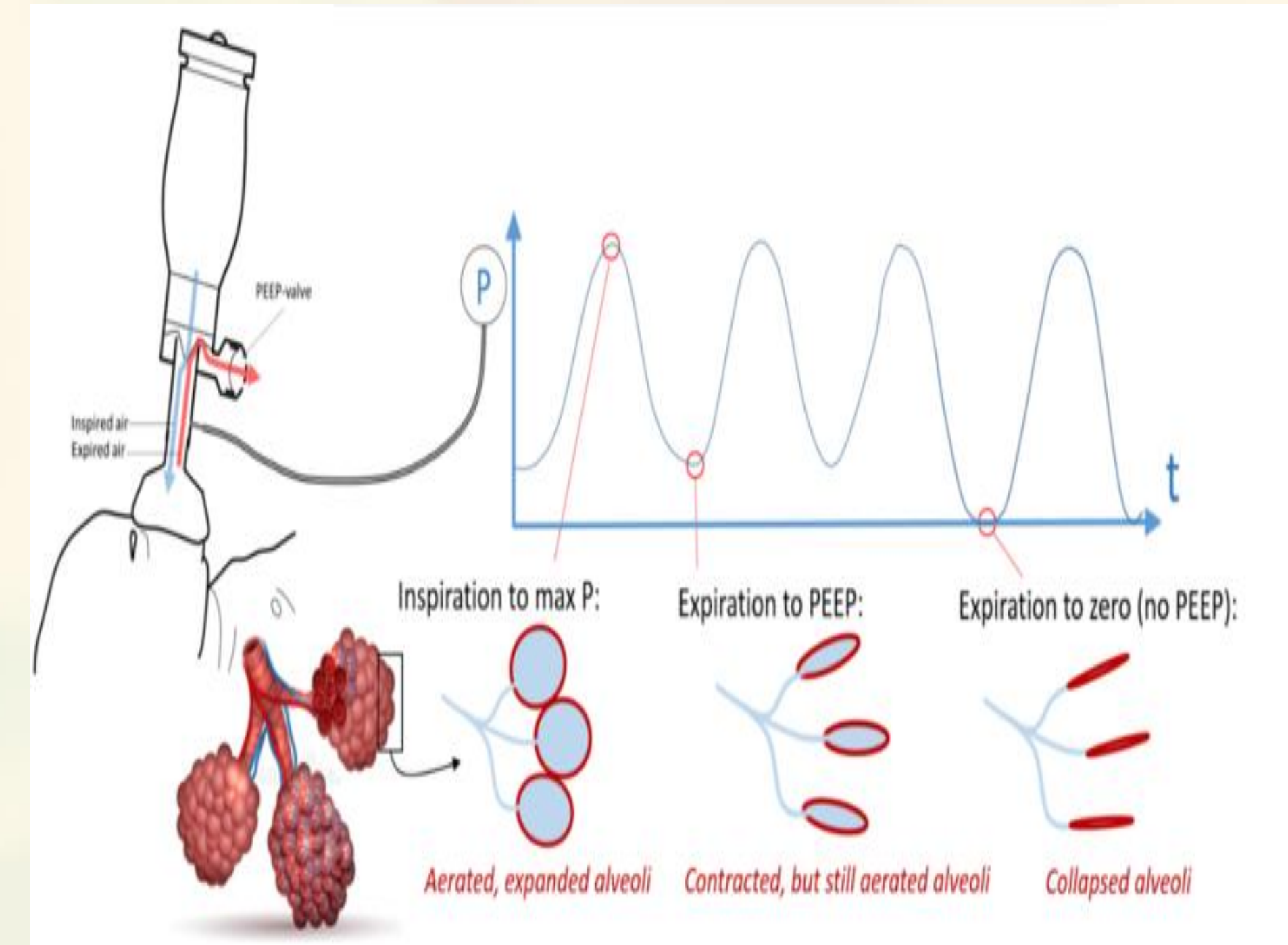
The PEEP-ZEEP maneuver is an advanced airway clearance strategy that combines Positive End-Expiratory Pressure (PEEP) and Zero End-Expiratory Pressure (ZEEP) to **optimize the mobilization and expulsion of mucus** in patients with chronic respiratory conditions such as chronic obstructive pulmonary disease (COPD), cystic fibrosis (CF), and bronchiectasis.





# Physiological Rationale

- **PEEP** prevents alveolar collapse; maintains airway patency.
- **ZEPP** allows complete exhalation and enhances mucus expulsion .

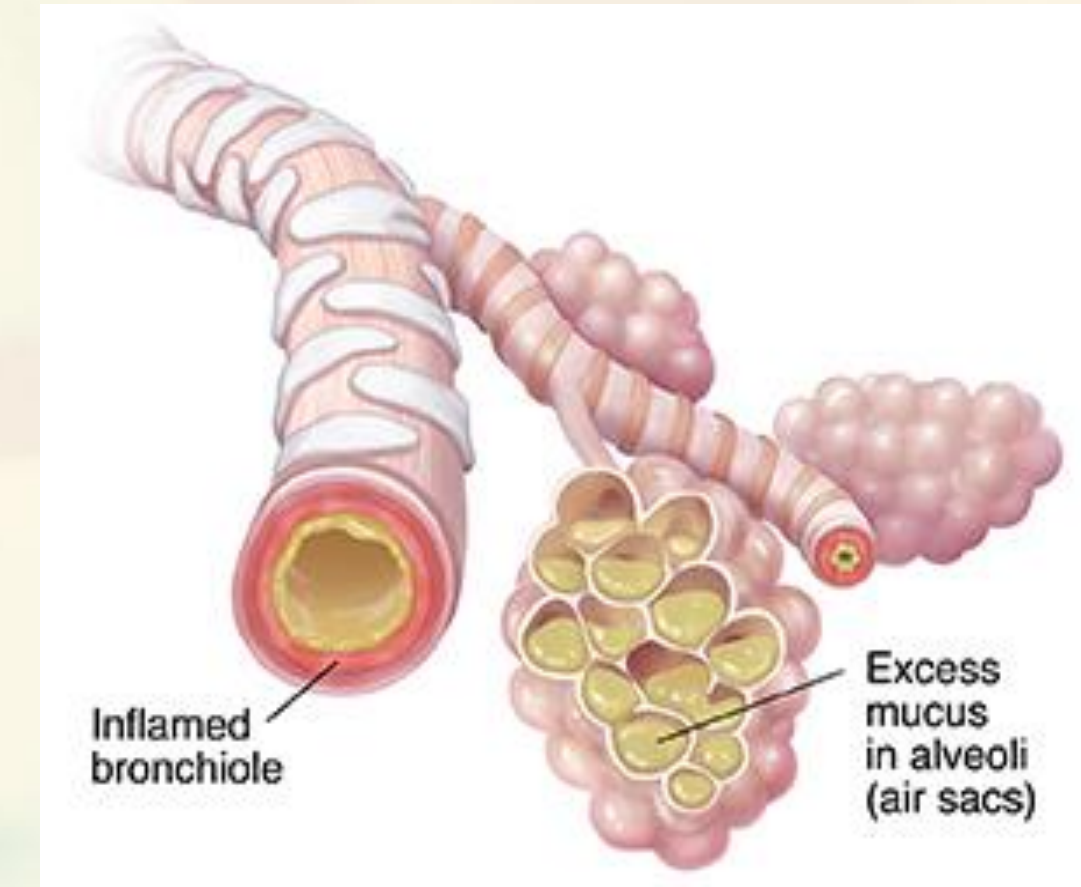






## Indications

- Excessive mucus retention.
- Difficulty in airway clearance.
- Preventing post-operative pulmonary complications.
- Managing ventilator-associated pneumonia (VAP).







## BENEFITS

- Improved oxygenation
- Better secretion clearance
- Reduced atelectasis
- Enhanced lung compliance
- Lower risk of ventilator-associated complications
- Reduction in Work of Breathing



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## How to apply PEEP ZEEP

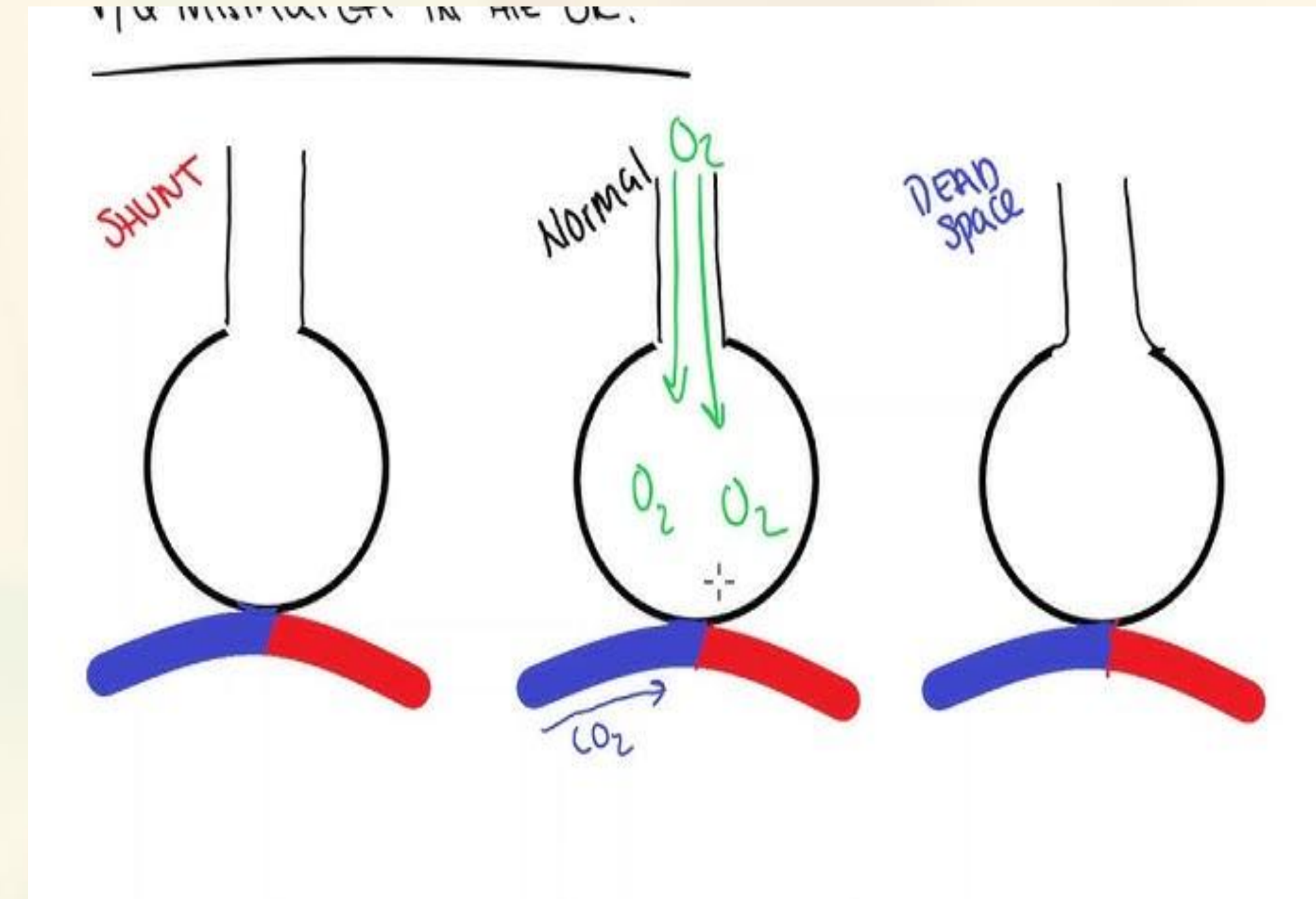
- Apply **elevated PEEP** (15–20 cmH<sub>2</sub>O) for 3–5 breaths to **recruit alveoli**.
- **Drop to ZEEP** (0 cmH<sub>2</sub>O) for 1–2 breaths to **mobilize secretions**.
- Repeat and follow with suctioning.





## How Does It Work?

- **During PEEP:** Positive pressure maintains airway patency and improves lung ventilation.
- **During ZEEP:** The removal of positive pressure facilitates complete exhalation, aiding in the expulsion of mucus.
- This dynamic process helps to clear both small and large airways, improving ventilation and reducing the work of breathing.



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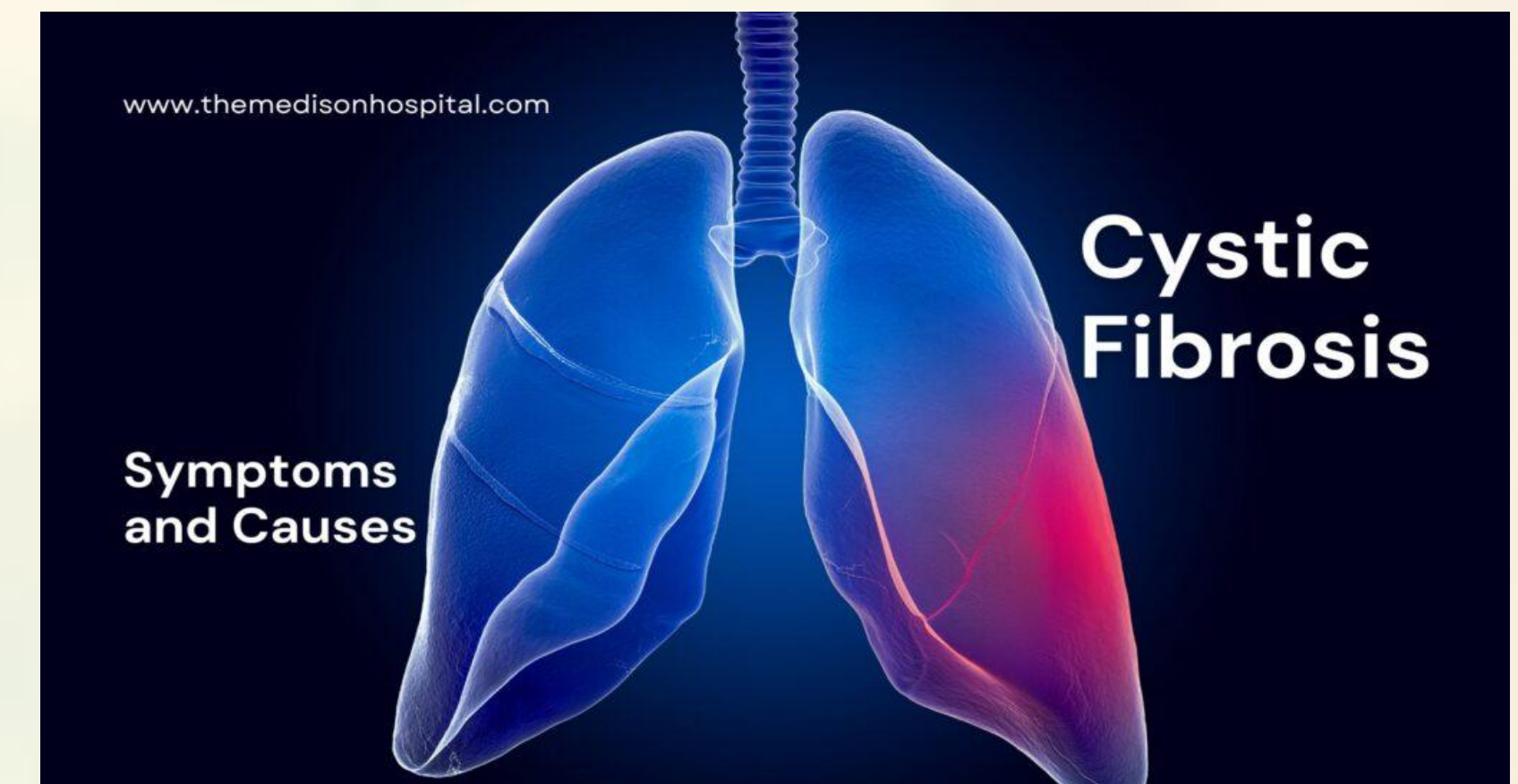
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## Clinical Applications

- COPD
- Cystic fibrosis
- Bronchiectasis
- Also useful in critical care for preventing atelectasis and improving lung function in acute respiratory distress.



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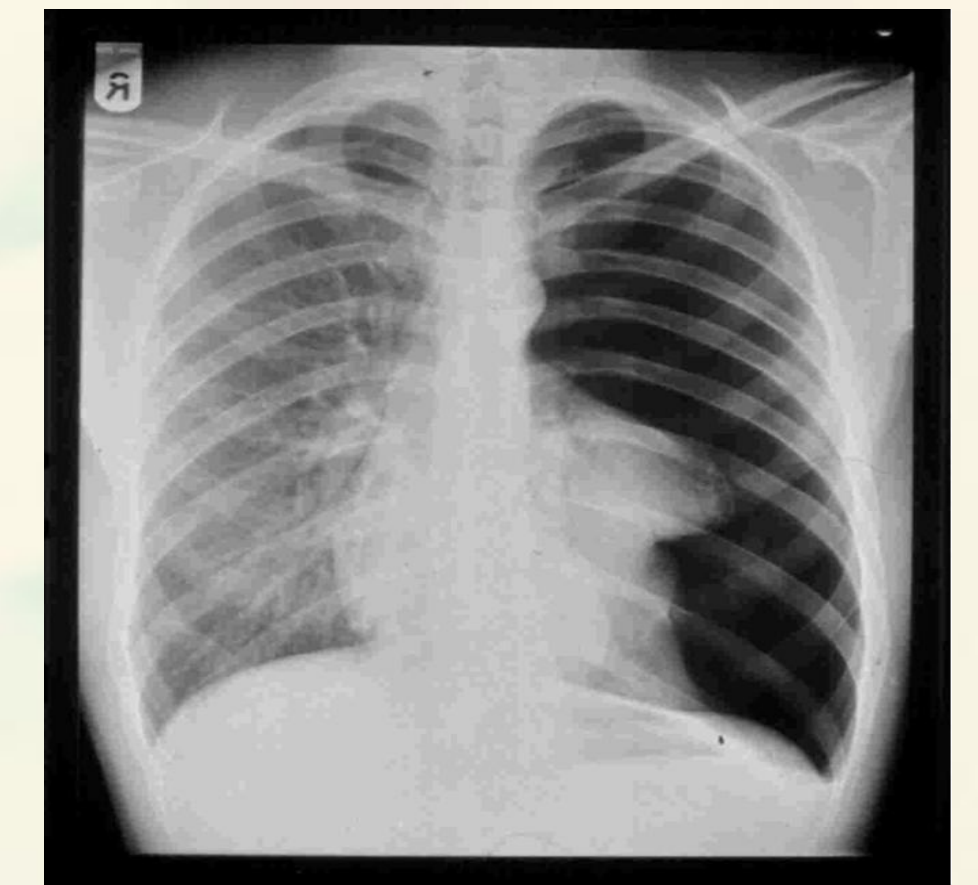
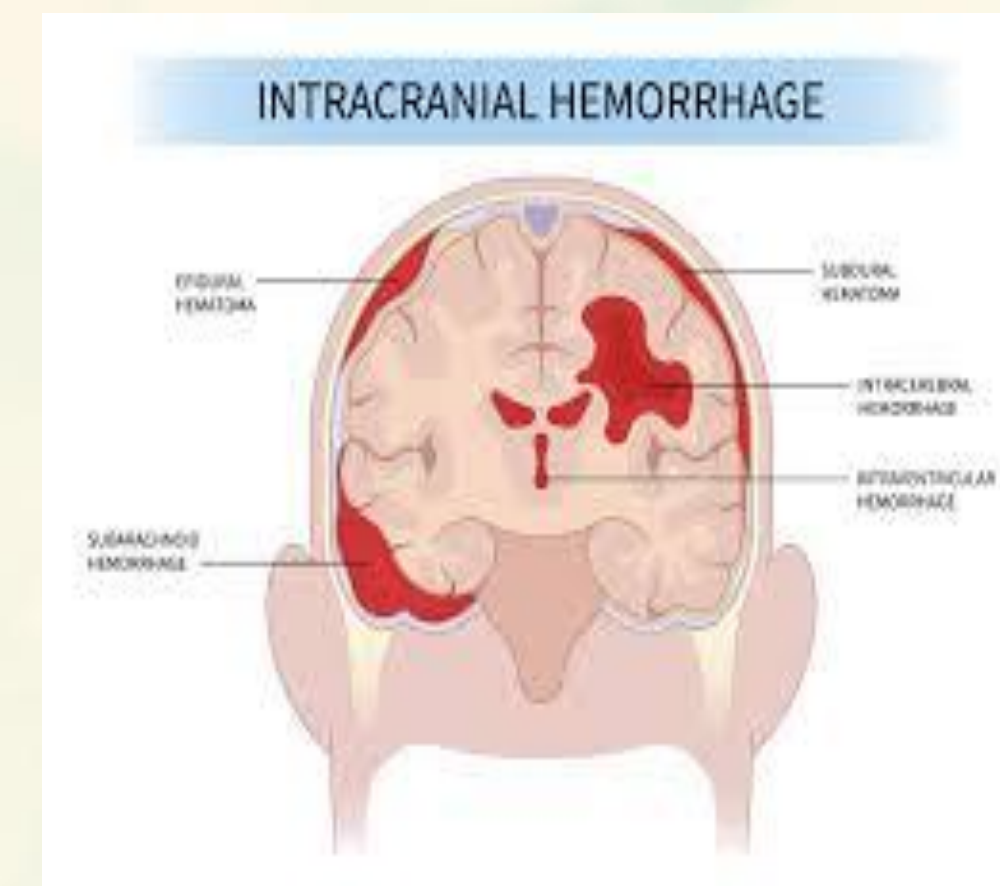
## Risks and Contraindications

### Risks:-

- Barotrauma, Hemodynamic instability, Bronchospasm , Increase intracranial pressure .

### Contraindications:

- Pneumothorax, Severe hemodynamic instability ,Intracranial hemorrhage , Recent lung injury or surgery

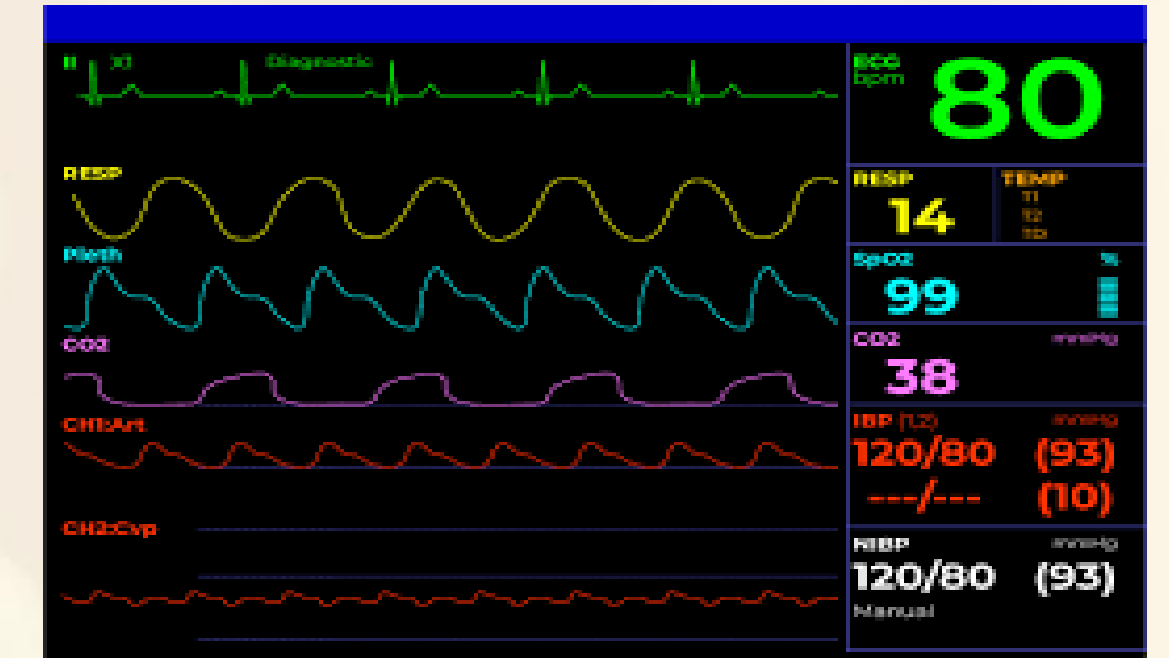






## Nursing and RT special Considerations during procedure

- Monitor SpO2, HR, BP, respiratory pattern.
- Preferred to Use with closed suction system.
- Document response and outcomes.



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## RESULT

**This systematic review analyzes studies conducted from 2015 to 2023 on the efficacy and safety of the PEEP-ZEEP maneuver in mechanically ventilated patients.**

**7 studies (n = 350 patients) showed an average SpO<sub>2</sub> increase of 8–15% post-PEEP-ZEEP maneuver.**

- **Oxygenation improvement was statistically significant in most cases.**





# Conclusion

- PEEP-ZEEP is **simple, cost-effective, and clinically impactful.**
- It improves pulmonary mechanics and supports better outcomes.



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