



**Hillrom™**



# IMPORTANCE OF AIRWAY CLEARANCE



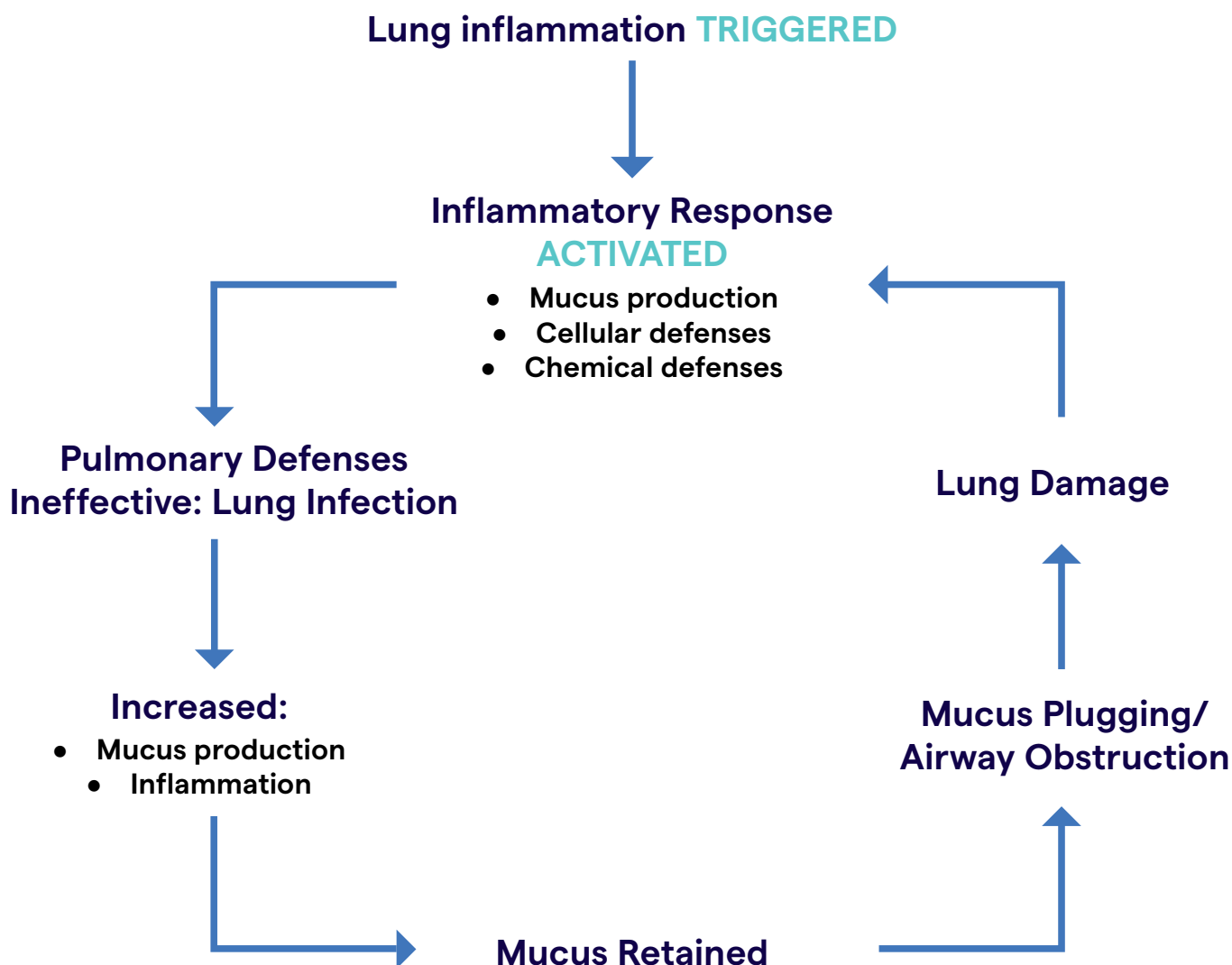
Non-Invasive  
Respiratory Therapy

# What Causes Impaired Airway Clearance?

Many acute and chronic diseases of the respiratory tract can be linked to diminished airway clearance. Diminished airway clearance can be the result of a number of underlying conditions, including excessive production of mucus or impaired functioning of the mucociliary transport<sup>1</sup>. Typically, as part of normal airway protection, airway clearance mechanisms in place, including the mucociliary escalator, coughing, and microscopic organisms help to keep the respiratory tract clear of secretions obstructions and help to eliminate pathogens.

Obstruction of the airway due to retained secretions, results in breathing difficulty and impaired gas exchange. Impaired secretion clearance also places patients at risk for inflammation and infection, thus leading to a variety of illnesses and overall poor lung health<sup>1</sup>.

Some of the potential factors that are associated with impaired airway clearance include: airway inflammation and bronchoconstriction/asthma, increased secretion production, ineffective respiratory muscle and neuromuscular functioning, infections as well as obstructions in pathways<sup>2</sup>.



## How Impaired Airway Clearance Leads to Chronic Pulmonary Complications.

An example can be seen in patients with Bronchiectasis, a disease which proves to be a gateway to a lifelong battle. The disease can be the result of numerous underlying pathologies, causing recurrent respiratory illnesses, shortness of breath, a reduction in the cough effectiveness as well as hemoptysis. The retained secretions lead to repeated infections and airway damage<sup>3</sup>.

The cycle of respiratory illness highlights the recurrent nature of lung infections. Primarily Bronchiectasis involves the infection and inflammation of bronchioles. Inflammation causes the increased secretion of mucus, heightening the risk of infections. This further stimulates hypersecretions, clogging the airways. The surface hydration of the pulmonary tract is another key factor in the maintenance and improvement of airway clearance. When dehydration occurs, the mucus' composition becomes thicker and interferes with clearance. The production of biofilm can also inhibit the penetration by antibiotics, making the patient more susceptible to illnesses. With this, there is further potential for lung damage, leading to inflammation, thus the vicious cycle begins once again. In Cystic Fibrosis there is also an influx of exceptionally thick bronchial secretions which amplifies the lung damage caused by the cycle<sup>3, 4, 5</sup>.



## What Pulmonary Diseases Easily Come with Chronic Pulmonary Complications?

Pulmonary disorders, particularly Cystic Fibrosis (CF), COPD and bronchiectasis have an impact on the production of mucus, as well as its composition. There are also mucociliary clearance disorders, including primary ciliary dyskinesia, which alter the function and structure of the ciliary.

### What is COPD?

Chronic Obstructive Pulmonary Disease (COPD) is a progressive illness which is mostly observed within those above 45 years of age<sup>6</sup>. The patients have partially reversible restriction of flow in their airways<sup>7</sup>.

Chronic Obstructive Pulmonary Disease (COPD)		
Country	Prevalence Rate	Rank of Death of Cause
China <sup>13-17</sup>	8.2%	4th in rural; 3rd in urban
Australia <sup>18</sup>	14.28%	5th
Japan <sup>19</sup>	4.1%	22nd
Korea <sup>20</sup>	14.6%	8th
Singapore <sup>21</sup>	2.3%	10th
Taiwan <sup>22</sup>	5.4%	9th
Hong Kong <sup>23</sup>	0.5%	8th
Thailand <sup>24</sup>	5.0%	7th

In the **Asia Pacific Region**, COPD has one of the highest incidence, when compared to other respiratory illnesses, ranking in the top 10 causes of death in most of the regions.



COPD prevalence in the Asia-Pacific region, as a whole, is estimated to be **10.6% of the adult population**<sup>8</sup>.

**TOBACCO  
SMOKING**

**AIR POLLUTION**

**OCCUPATIONAL  
EXPOSURE**

are the most common  
etiological contributors<sup>8</sup>.

Number of COPD



According to the WHO estimates, the number of **COPD cases in Asia exceeds by three times** the total number of COPD cases for the rest of the world<sup>9,10</sup>.

# Did You Know?

As COPD is a progressive illness, there exists high costs on the patient. The annual cost endured by a patient in Japan ranged from \$4398 to \$23,049 taking into account the severity of the illness. In South Korea, it ranges from \$453 to \$12,167. These two countries have a high burden on COPD patients, exceeding that of the United Kingdom and United States of America.

On average the annual cost of a patient belonging to the Asia Pacific region is \$4191. The burden of the disease causes further economic costs as they cause impairments to work productivity, additionally costing the patient \$7315<sup>12</sup>.

COPD causes a large burden on both disease prevalence and costs. Both of which are predicted to increase in the future.



Chronic Obstructive Pulmonary Disease (COPD)	
Country	Economic Burden
China <sup>11</sup>	\$3,942
Japan <sup>11</sup>	\$4,398 to \$23,049
Korea <sup>11</sup>	\$453 to \$12,167
Singapore <sup>11</sup>	\$2,700
Taiwan <sup>11</sup>	\$4,000
Thailand <sup>11</sup>	\$1,105



## Effective Airway Clearance Would Be The Solution

Certain respiratory diseases such as COPD, impair functioning of the ciliary, increase secretion of mucus and may result in weak or ineffective cough. Airway clearance techniques are commonly prescribed to COPD patients as a means to enhance sputum clearance, most notable during acute exacerbations. This includes manual interventions, as well as mechanical interventions: Positive Expiratory Pressure (PEP), Oscillating Positive Expiratory Pressure, High Frequency Chest Wall Oscillations (HCFWO) and more<sup>7</sup>. COPD causes a large burden on both disease prevalence and costs. Both of which are predicted to increase in the future.



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