Journal Article

Acute asthma exacerbations are precipitated by triggers, such as pollutants, viral illnesses, irritants, and several allergens. The natural pathophysiology of asthma involves chronic airway inflammation, bronchial hyperresponsiveness, and intermittent airflow obstruction. These responses are driven by an immune response to allergens or pollutants, stimulating the release of mediators, smooth muscle constriction, and mucosal secretion. As a result, asthma patients have symptoms of wheezing, cough, or shortness of breath. Asthma exacerbation is a worsening of these symptoms, and are more often triggered by viral infections and allergens. Over time, chronic inflammation from asthma can cause airway remodeling, which can contribute to exacerbation severity and frequency. Patients with poorly controlled asthma or long standing disease may develop structural changes to their airways that may reduce the responsiveness to typical asthma therapies, such as inhaled corticosteroids.

Risk factors for asthma exacerbation include air pollution and temperature changes. Colder weather poses an increased risk of exacerbations, especially in young and elderly patients. In terms of treating asthma exacerbations, new treatments involving biologic therapies are being developed to target specific cytokines that can help with improving symptoms. A study demonstrated an emerging treatment of suppressing IL-33 cytokine immune response, which led to decreased ability of dendritic cells to produce an inflammatory response. IL-33 is found primarily in bronchial epithelial cells and type II pneumocytes. Therefore, targeting IL-33 might be useful to reduce asthma and improve the overall antiviral respiratory immune response.

Current treatment and management for asthma exacerbation involves using combination inhalers to manage symptoms acutely. Budesonide-formoterol is a maintenance and reliever therapy and it is found to reduce the short term risk of severe exacerbation after a single day of use. Additionally, rescue inhalers and duo nebulizer treatment can be utilized as well. For severe cases, oxygen may be administered if the patient has an SpO2 less than 90% and steroids, such as prednisone, can be given to reduce inflammation.

Miller, R. L., Grayson, M. H., & Strothman, K. (2021). Advances in asthma: New understandings of asthma's natural history, risk factors, underlying mechanisms, and clinical management. *Journal of Allergy and Clinical Immunology*, *148*(6), 1430-1441. https://doi.org/10.1016/j.jaci.2021.10.001