



Factors Predicting Recovery From Asthma Exacerbations

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Asthma is one of the most common chronic respiratory diseases worldwide. Despite the regular use of maintenance medications, asthma exacerbations (AEs) can be triggered by various factors. AEs are potentially life-threatening, triggering visits to emergency departments and unscheduled healthcare use in many countries.^{1,2} Therefore, AE prediction and prevention are critical in terms of improved asthma management.^{3,4}

Previous studies have suggested that factors associated with acute AEs include reduced baseline lung function,⁵ poor adherence to medications, cessation of regular use of inhaled corticosteroids (ICSs),⁶⁻⁸ viral infections,^{3,9} and comorbid conditions, including allergic rhinitis.¹⁰ Several markers for asthma activity have been suggested to reflect recovery from AEs. Such markers include not only pulmonary function but also the symptom scores,⁵ the peripheral eosinophil count,¹¹ the fraction of exhaled nitric oxide (FeNO),^{12,13} and the serum levels of vascular endothelial growth factor¹⁴ and soluble CD93.¹⁵ However, no markers have been validated to an extent permitting their use, in real practice, to predict and monitor AEs and recovery time therefrom.

In this issue of the AAIR, Kim *et al.*¹⁶ evaluated both clinical characteristics and laboratory data to define factors associated with recovery time after AE. Serial pulmonary function tests were performed on 113 patients hospitalized with AEs in a single tertiary center. They also evaluated comorbid and other medical conditions in their study subjects. The mean recovery time was 1.7 weeks, ranging from 1 day to 14 weeks. It is suggested that concurrent viral infection at admission and regular ICS use prior to AE delay the recovery of pulmonary function, unlike in previous studies.⁶⁻⁸ The delayed recovery time may be attributed to several factors. First, this is a real-world study on hospitalized asthmatic patients. Only older hospitalized patients were enrolled (mean age, 57.6 ± 17.9 years; range, 18-95 years); these patients presented with more severe symptoms than those treated in outpatient clinics. Most previous studies on AE enrolled subjects with mild-to-moderate asthmatics who had been followed up in outpatient clinics;^{5,12} patients with any history of respiratory infections or a concomitant disease other

than asthma were excluded.^{8,15,17} Only a few studies have enrolled hospitalized adults exclusively.^{17,18} The subjects were divided into 3 groups according to age and clinical characteristics. Older patients had more severe asthma symptoms, a higher prevalence of comorbid conditions, a longer hospital stay, and a higher readmission rate than younger patients. These findings suggest that older hospitalized patients may have different subtypes and do not respond to standard pharmacological treatments including steroids. Secondly, this is a retrospective study. Thus, objective parameters, including symptom score, the daily peak expiratory flow rate, or the levels of inflammatory markers such as FeNO, could not be used to monitor recovery from AEs. Indeed, changes in pulmonary function were monitored in only 89 (78.8%) of the 113 patients. Thirdly, patients who had used ICSs regularly have longer recovery times. This may be because patients in regular use of ICSs are older and have more severe symptoms, in terms of more episodes of AEs and use of systemic steroids to treat asthma in the past year, and higher levels of comorbid conditions, including ischemic heart disease and pneumonia.

In conclusion, to define factors predicting AEs and recovery time therefrom, it is essential to maintain regular use of ICSs when it is sought to prevent AEs in adult asthmatic patients. Further prospective real-world studies are required to validate factors predicting and preventing AEs in various patient settings.

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