

Nonpharmacologic Therapy for Severe Persistent Asthma



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The treatment of asthma largely depends on guideline-based pharmacologic therapies. However, nonpharmacologic therapies for asthma such as pulmonary rehabilitation, focused breathing techniques, and bronchial thermoplasty have an important, yet underappreciated, role. Structured pulmonary rehabilitation programs can reduce dyspnea and increase cardiopulmonary fitness. The educational component of these programs can ensure that therapies are being used appropriately, increase compliance, and decrease health care utilization. Studies have demonstrated a reduction in inflammatory mediators in patients with asthma who are engaged in an exercise program. Focused breathing techniques are commonly used by patients with asthma, yet benefit has not been clearly shown in randomized controlled trials. For the patients with severe asthma who are unresponsive to maximum medical therapy and have evidence of airway remodeling, bronchial thermoplasty has demonstrated long-term improvement in quality of life and reduction in severe exacerbations and health care utilization. Recent airway biopsy studies have demonstrated bronchial thermoplasty's disease-modifying effect on smooth muscle, inflammatory mediators, and bronchial nerve endings. These nonpharmacologic therapies are complementary to current guideline-based treatment, including the use of biologic modifiers, for severe asthma. © 2017 American Academy of Allergy, Asthma & Immunology (J Allergy Clin Immunol Pract 2017;5:928-35)

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INTRODUCTION

Patients with severe asthma, representing 5% to 10% of all patients with asthma, have disease refractory to treatment with high-dose inhaled corticosteroids (ICSs) plus a second controller medication, or the need for continuous or near-continuous (>50% of year) oral corticosteroids (OCSs).¹ Patients with severe persistent asthma present the greatest burden to the health care system,² with those with refractory asthma having the highest health care utilization including intensive care unit stays.³

The optimal management of persons with chronic disease generally requires blending of nonpharmacologic and pharmacologic therapies. Consistent with this idea, therapy for the patient with severe asthma—which includes often highly effective reliever and controller medications—may be optimized further by the addition of nonpharmacologic therapy. The remarkable success of ICSs in randomized controlled trials (RCTs) leads to a false conclusion that pharmacotherapy is all that is needed for every patient with asthma. However, medications do not work if they are not taken, so the nonpharmacologic intervention of promoting adherence can be beneficial to optimize the care of patients.

In addition, remodeling of airways in severe asthma, particularly smooth muscle hypertrophy, can lead to airflow obstruction and bronchial hyperreactivity unresponsive to pharmacotherapy. This smooth muscle phenotype represents a unique target for bronchial thermoplasty when patients are not responding to anti-inflammatory therapy. Finally, dyspnea associated with exercise in severe persistent asthma leads to activity limitation and physical deconditioning—nonpharmacologic interventions such as exercise training and physical activity promotion complement standard drug therapy in this situation. This review will focus on 3 potentially important nonpharmacologic therapies for severe asthma: pulmonary rehabilitation (and its components), Buteyko breathing technique (BBT), and bronchial thermoplasty (BT).

PULMONARY REHABILITATION AND ASTHMA

Referral of patients with asthma to pulmonary rehabilitation is encouraged in a policy statement by the American Thoracic Society and the European Respiratory Society, which recommended expanding the delivery of pulmonary rehabilitation beyond chronic obstructive pulmonary disease (COPD) to include, among other respiratory diseases, asthma.⁴ Pulmonary rehabilitation has been defined as "... a comprehensive intervention based on a thorough patient assessment followed by patient-tailored therapies, which include, but are not limited to, exercise training, education, and behavior change, designed to improve the physical and psychological condition of people with chronic respiratory disease and to promote the long-term adherence of health-enhancing behaviors."⁵ It is important to

Abbreviations used

AIR- Asthma Intervention Research
BT- Bronchial thermoplasty
BBT- Buteyko breathing technique
COPD- Chronic obstructive pulmonary disease
ED- Emergency department
ICS- Inhaled corticosteroid
OCS- Oral corticosteroid
PaCO₂- Partial pressure of carbon dioxide
QOL- Quality of life
RCT- Randomized controlled trial
RR- Relative risk

note that exercise training is not synonymous with pulmonary rehabilitation—it is a necessary, but not sufficient, component of the comprehensive intervention.

Typically, pulmonary rehabilitation does not improve lung function (such as the FEV₁ or peak flow) in individuals with COPD, yet it results in reduced dyspnea, increased exercise capacity, improved health-related quality of life (QOL), and (arguably) reduced health care utilization.⁴ These positive outcomes of obvious importance to the patient reflect the potentially beneficial effect of rehabilitation on often-present systemic manifestations and maladaptive behaviors that contribute to the burden of patients with advanced disease.

In its current form, pulmonary rehabilitation is provided by an interdisciplinary team and—in the United States—is typically given in outpatient, hospital-based settings. Most formal programs involve 2- to 4-hour sessions, 2 to 3 times weekly, for 6 to 12 weeks. Pulmonary rehabilitation was originally developed to manage COPD,⁶ and most of its scientific literature pertains to this disease. However, there is rationale and some empiric support for its application in asthma.

Adapting pulmonary rehabilitation to address phenotypic variability in asthma: “One size does not fit all”

The diverse nature of asthma phenotypes underscores the even greater requirement for pulmonary rehabilitation in asthma to tailor its therapy to the particular needs of the patient. Specific interventions will reflect the clinical status of the patient, which can range widely: from the child with exercise-induced asthma, to the individual with severe disease and frequent exacerbations and health care utilization, to the older patient with fixed airways obstruction and relatively constant exertional dyspnea. Adults with asthma typically have lower levels of physical fitness and greater impairments in QOL than do their counterparts without asthma.⁷ Pharmacotherapy to prevent exercise-induced bronchospasm should be used, when indicated. For patients with mild disease, general aerobic training, with less need for one-on-one monitoring, and a generic goal to increase fitness are reasonable. For those with severe obstruction, more pronounced physical deconditioning, greater exercise limitation, and higher likelihood of comorbidity, exercise training as part of a structured pulmonary rehabilitation program is in order.

The educational component of pulmonary rehabilitation focuses on the learning needs of the patient with asthma. Educational topics include promotion of adherence, use of exacerbation action plans, promotion of physical activity, regular exercise, and weight reduction (when indicated), and avoidance of triggers,

pollutants, and occupational exposures. Pulmonary rehabilitation tailors this education to the specific needs of the particular patient.

For individuals with asthma controlled with medications such as ICSs, examples of appropriate nonpharmacologic interventions include education on the avoidance of triggers; encouragement of a healthy lifestyle, including regular exercise and activity; influenza and pneumococcal vaccinations; weight optimization; and promotion of adherence with medications. With respect to exercise, patients with asthma are less likely to meet national exercise guidelines than the general population, an effect that appears to be more closely related to obesity than to asthma control or severity.⁸ The benefits from regular exercise are expected to be similar to those of the general population. For those patients with frequent or severe exacerbations, promotion of collaborative self-management centering on an exacerbation action plan is indicated. This can be facilitated in a rehabilitation setting. For those with physical deconditioning, exercise training based on sound physiologic principles would be in order.

The more the patient with asthma resembles the patient with COPD (such as the older patient with airways remodeling and fixed airways obstruction, chronic exertional dyspnea, and comorbid conditions), the stronger is the indication for conventional, center-based pulmonary rehabilitation. The elderly patient with asthma, who often displays many of the features of COPD,⁹ the individual with extensive airway remodeling,¹⁰ and the patient with asthma-COPD overlap syndrome¹¹ would fall into this category. With respect to the latter, a joint project of Global Initiative of Asthma and the Global Initiative for Obstructive Lung Disease recommends that the following be provided to all patients with chronic airflow limitation: (1) treatment of modifiable risk factors; (2) treatment of comorbidities; (3) nonpharmacologic strategies, including pulmonary rehabilitation; (4) self-management; and (5) regular follow-up.¹² These 5 recommendations constitute much of comprehensive pulmonary rehabilitation.

Pulmonary rehabilitation in asthma: Set menu or a la carte?

Pulmonary rehabilitation typically refers to a “complete package,” a 6- to 12-week program run by a team of professionals, beginning with a thorough assessment, goal-setting, and incorporating exercise and education focusing on the specific needs of the patient. However, its components could (indeed, should) be provided individually when referral to a program is neither practical nor feasible. Exercise training, physical activity promotion, education on adherence, and collaborative self-management are not owned by pulmonary rehabilitation. These components do not necessarily have to be given in a formal program; rather they are part of standard medical, nursing, and pharmaceutical practice. Pulmonary rehabilitation components that may be useful in asthma management are listed in [Table I](#).

Outcomes from pulmonary rehabilitation or its components in asthma

Although most pulmonary rehabilitation programs include patients with asthma, few RCTs testing its effectiveness in this patient group exist. This probably reflects, in part, effective pharmacologic therapy for the patient with asthma, so only a minority need the traditional, comprehensive intervention. In addition, many patients with asthma, who are typically younger

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