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CME article

# The Adolescent with Asthma

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**EDUCATIONAL AIMS**

- To provide an overview of the physiological and psychosocial developmental factors related to the adolescent with asthma.
- To review incidence and etiology of psychological morbidity and contextual factors related to the adolescent with asthma.
- Describe the current and future approaches to the adolescent with asthma's adherence to treatment and transition into adult care.

ARTICLE INFO

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Transition of care.

SUMMARY

The adolescent with asthma experiences a period of physical and psychosocial changes that affect their health and well-being. Overall, adolescents with asthma are at increased risk for asthma morbidity and death. Increased rates of depression and anxiety, for the adolescent and their caregivers, can lead to non-adherence to their medical regimens, poor symptom control, and poor treatment outcomes. Contextual factors, such as race, ethnicity, and living situation, affect the prevalence, morbidity, and mortality for the adolescent with asthma. These factors also affect the transition process for adolescents entering adult medical care. An overview is presented of how the adolescent with asthma differs and how healthcare providers can promote effective asthma management and better asthma control.



## INTRODUCTION

Asthma is the most common pediatric chronic illness in the United States, affecting an estimated 6.2 million children under the age of 17.[1] Adolescents with asthma are at an increased risk for asthma morbidity and death.[2] Psychosocially, the adolescent must balance his or her desire for autonomy, family communication and conflict, peer relationships, and academic and vocational demands within the context of illness management. Adolescents with asthma are at greater risk of having at least one anxiety or depressive diagnosis compared to healthy peers[3] that may decrease adherence to treatment and ultimately lead to worse medical outcomes.[4,5]

The goal of asthma management is to achieve the best asthma control with the least amount of medications.[6] According to the National Asthma Education Program (NAEP), clinicians seek to achieve asthma control to reduce interference with activities of daily living (ADLs), current impairment, and future risk.[7] Although effective self-management can improve asthma control and reduce asthma morbidity, adherence to asthma medical regimens often declines during adolescence.[8] Adolescents may struggle with the responsibility of managing asthma based on the psychological and medical burden related to asthma, and may continue to struggle into adulthood. Limited research has looked specifically at adolescents with asthma and their transition into adulthood.[9]

The purpose of this review is to twofold. First, we aim to provide physicians and other healthcare providers with a summary of clinical and research findings on the developmental aspects of adolescents with asthma (e.g., physiological, psychosocial). Second, we review research related to adolescent psychological functioning, adherence to treatment, and transition into adult care. This review provides an overview of how adolescents with asthma differ from other age groups with asthma, as well as how healthcare providers can best care for an adolescent with asthma and promote effective asthma management and better asthma control.

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*Abbreviations:* CAM, complementary and alternative medicine.

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## ADOLESCENT PHYSIOLOGICAL DEVELOPMENT AND ASTHMA

### *Gender differences*

Preadolescent boys have a higher prevalence of wheeze and asthma than girls. In adolescence, however, the onset of wheeze is greater in females than males and asthma is more severe. Prospective studies support the hypothesis of a higher incidence of asthma and wheeze in girls after puberty.[10] Female sex appears to be an independent risk factor for non-allergic asthma at all ages, but particularly during adolescence and young adulthood.[11] Supporting these data is the observation that women with early menarche have lower lung function and more asthma in adulthood.[12] In women with asthma, respiratory symptoms change significantly during the menstrual cycle and are most frequent from the midluteal to midfollicular stages, and less common near the time of ovulation. Oral contraceptives appear to have a protective effect and reduce ovulatory cyclic asthma symptoms.[13]

The rate of hospitalization for asthma follows the same pattern as the incidence data, with a change from lower to a higher risk in girls after puberty.[14] Asthma hospitalization rates for boys are higher than for girls between ages 2–12 years, the gender gap in asthma hospitalizations reverses between ages 13–14 years, and rates for girls are significantly higher than boys between 16–18 years of age.[15] The risk of asthma severity and hospitalization is compounded in young women who are smokers.[16]

### *Obesity and smoking*

Obesity and overweight is increasing globally and is particularly problematic for adolescent girls. Obesity is also associated with asthma and the severity of asthma.[17] Both asthma and obesity are independently and synergistically associated with systemic inflammation[18] and obesity is associated with metabolic syndrome including type 2 diabetes mellitus and cardiovascular disease.[19]

In the United States, approximately 1.4 million children younger than 18 years start smoking each year and up to 90% of adult smokers began during adolescence. Two thirds of regular smokers became regular, daily smokers before they reached 19 years of age. Adolescents report symptoms of tobacco dependence early in the smoking process, even before becoming daily smokers. The prevalence of tobacco use is higher among teenagers and young adults than among older adult populations.[20] Current smoking is significantly associated with symptoms of asthma, such as having recent wheezing and recent exercise-induced wheezing, especially for adolescents who are not atopic.[21] Paradoxically, adolescents with asthma who smoke are at *increased* risk of nicotine dependence compared to those without asthma and the greater the symptom severity the more rapidly dependence develops.[22]

Environmental tobacco smoke also increases the frequency and severity of asthma. This exposure can occur in the home and when exposed to friends or classmates who are smokers. In Scotland, passage of smoke-free legislation in 2006 was associated with a subsequent reduction in the rate of respiratory disease in populations other than those with occupational exposure to environmental tobacco smoke, including school age children and adolescents.[23]

### *Exercise asthma and asthma misdiagnosis*

Asthma is both under diagnosed and increasingly, over diagnosed. The misdiagnosis of asthma is especially common in young people presenting with exercise-related symptoms or cough[24] and in those who are obese.[25] Adolescents with exercise induced dyspnea are far more likely to have normal or physiologic exercise limitation than to have asthma.[24]

Non-asthmatic wheeze (called "undiagnosed wheeze" by the investigators) accounted for 22% of wheezing at 18 years in the Isle of Wight cohort study. This was primarily associated with adolescent-onset and had similar symptom frequency and severity to diagnosed asthma. Those with non-asthmatic wheeze had normal pulmonary function test results, little or no bronchial hyperresponsiveness, and were less frequently atopic than those with asthma. The authors concluded that non-asthmatic wheeze is relatively common during adolescence, differs from diagnosed asthma and has strong associations with smoking and paracetamol (acetaminophen) use.[26]

## ADOLESCENT PSYCHOSOCIAL DEVELOPMENT AND ASTHMA

Psychosocial development for all adolescents involves dynamic changes in cognitive functioning, family and peer relationships, and school and vocational achievement. During adolescence, there are global improvements in reasoning and information processing with specific gains in abstract, multidimensional, planned and hypothetical thinking.[27] As such, asthma-related fears may become more emotional and cognitively sophisticated during adolescence.[28] For example, adolescents can more fully understand the limitations that asthma imposes and how this diagnosis challenges their autonomy and independence.

Identity formation and development are core psychosocial tasks of adolescence.[29] The adolescent's exploration and formation of their identity – in both their normative and medical worlds – may affect relationships with family and peers and adherence to treatment regimens.[2] Providers are encouraged to build rapport with the adolescent and interact with them without parents present to facilitate their trust in the medical environment and understand their individual experiences.[6]

### *Family factors*

Parents and families often assume much of the responsibility for child and adolescent asthma care. Family routines and effective problem solving within families can promote better adherence to asthma treatment regimens.[30] Family emotional climate has been found to affect asthma severity, triggering asthma symptoms when the emotional climate is dysfunctional.[31] Family functioning has also been associated with patient/provider relationships and treatment adherence in families with an adolescent with severe asthma.[32] Adolescents whose parents had higher ratings of self-esteem were described by physicians as being able to better form alliances with physicians. Interestingly, physicians reported better alliances with parents who reported *worse* overall family functioning, suggesting that physicians may be more likely to intervene with families identified as having inadequate parental involvement.[32] Consistent with NHLBI guidelines highlighting the importance of patient/provider partnership in effective asthma management,[33] family functioning may be associated with positive asthma outcomes in adolescents through strong alliances between families and providers.

### *Peer factors*

Successful peer interactions during adolescence affect identity formation, self-image, psychological adjustment, and adherence to treatment.[34,35] Feelings of embarrassment about asthma have been linked to not carrying an inhaler or being less likely to use asthma medications in front of peers. Adolescents may also choose not to use medications for fear of being "interrogated" about their medications in front of others.[36] However, adolescents who report