

Predictors of Uncontrolled Asthma in Adult and Pediatric Patients: Results from the Asthma Control Characteristics and Prevalence Survey Study (ACCESS)

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ABSTRACT

BACKGROUND: Many patients have asthma that is inadequately controlled, contributing to significant morbidity and burden to patients and caregivers.

OBJECTIVES: Identify risk factors for uncontrolled asthma in pediatric and adult asthma patients.

METHODS: Two parallel cross-sectional surveys were conducted in 35 adult and 29 pediatric primary care practices in the United States (US). Participants included 2,238 adults (aged ≥ 18 years) and 2,429 children (aged 4-17 years; and their caregivers) with asthma, visiting their health care provider for a scheduled appointment for any reason. A standardized assessment of asthma control, including questions about possible characteristics related to asthma control, was completed. Uncontrolled asthma was defined as a score of ≤ 19 on the Asthma Control TestTM (ACT) or Childhood ACT. Unconditional multivariable logistic regression was used to calculate odds ratios (OR) and 95% confidence intervals for predictors of uncontrolled asthma.

RESULTS: Prevalence of uncontrolled asthma was 58% in adults and 49% in children. Common self-reported independent predictors (OR > 1.5) of uncontrolled asthma in both adults and children were asthma severity rated as moderate or severe and recent history of cold, flu, or sinus infection. Independent predictors of uncontrolled asthma seen only in adults were current smoker, education level less than college, Medicaid insurance, and body mass index (BMI) > 30. Independent predictors of uncontrolled asthma seen only in children were female gender in those aged 12 to 17 years and caregiver unemployment.

CONCLUSIONS: Uncontrolled asthma is common in patients with asthma seen in primary care settings. This study may help identify specific risk factors and target patients who may be at increased risk for uncontrolled asthma.

(GSK Studies ADA 111118 and ADA 111119)

BACKGROUND

- Asthma is a chronic inflammatory lung disease that poses a significant economic and medical burden in the US.
 - US adults in 2005:
 - 22.2 million were diagnosed and 3,884 deaths were attributed to the disease.
 - 12.8 million visited office-based physicians and 1.8 million visited the emergency room.
- US children in 2004:
 - 10 million had been diagnosed with asthma at some point during their lifetime.
 - 7 million had outpatient visits, 754,000 had emergency room visits, and 198,000 were hospitalized.
- Future disease exacerbations can be decreased through appropriate disease management and identification of risk factors for poorly controlled asthma.
- Standardized, validated assessment tools such as the ACT and the Childhood ACT are recommended by current treatment guidelines to help health care professionals assess asthma control in their patient population.^{1,2,3}

OBJECTIVES

- Identify risk factors for uncontrolled asthma in adults with asthma who were visiting their primary care provider (PCP) for any reason
- Identify risk factors for uncontrolled asthma in children with asthma who were visiting their pediatric health care provider (HCP) for any reason

METHODS

Study Design

- Two parallel cross-sectional surveys conducted: one in 35 adults and the other in 29 pediatric primary care practices in the US
- Participants: 2,238 adults with asthma (aged ≥ 18 years), 2,429 children with asthma (aged 4-17 years) and their caregivers (Figures 1 and 2)

Figure 1. Consort Diagram for Adult Study

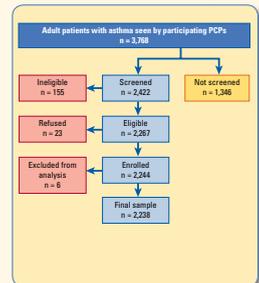
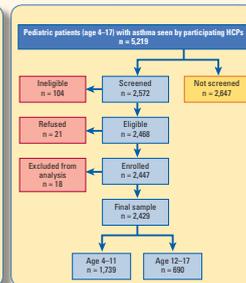


Figure 2. Consort Diagram for Pediatric Study



METHODS

Site Selection and Eligibility

- Adult primary care sites were identified from a proprietary database of more than 2,000 US physicians who are members of the Primary Care Network, an organization that provides continuing medical education to its members.
- Pediatric sites were selected for screening based on referral from PCPs in this network, as well as screening of yellow page directories from the specific geographic areas.
- Study sites were excluded if they did not have at least one PCP on staff willing to serve as the site's principal investigator.
- To minimize selection bias, sites were also excluded in the following cases:
 - Specialized in asthma treatment or had an asthma specialist on staff
 - Had participated in a respiratory-related clinical research study in the previous 3 years
 - Used the ACT regularly to monitor their patients with asthma, or
 - Were not willing or able to generate a list and accurate count of all patients with asthma seen in the office during the study period.

Patient Recruitment and Eligibility

- Patients coming into the office for a scheduled appointment were screened for eligibility and asked to provide consent.
- Participants were enrolled from January 2008 to May 2008.

Eligible Adult Patients

- Were aged 18 years or older at the time of screening
- Self-reported to have HCP-diagnosed asthma
- Reported no history of chronic obstructive pulmonary disease (COPD), chronic bronchitis, or emphysema
- Reported use of at least one asthma medication in the previous year, including albuterol

Eligible Pediatric Patients

- Legal guardian available, willing, and able to provide informed consent prior to study participation
- Were aged 4 to 17 years at the time of screening
- Self- (or caregiver-) reported HCP-diagnosed asthma
- Self- (or caregiver-) reported no history of cystic fibrosis or chronic bronchitis
- Able to read, write, and/or comprehend information in English or Spanish (caregivers completed questionnaires for younger participants)
- No other current participation in respiratory-related research studies

Main Outcome Measure

- Uncontrolled asthma was defined as a score of < 19 on the ACT (Figure 3) or Childhood ACT (C-ACT) (Figure 4).
- Potential risk factors were determined based on a self-administered study questionnaire that included questions about demographics, education, insurance and income, reason for visit, history of asthma exacerbations, and resource utilization related to asthma and select comorbid conditions.

Figure 3. Asthma Control Test

Figure 4. Childhood Asthma Control Test

Analysis

- Factors associated with uncontrolled asthma:
 - Backward selection was used to determine the best model for predicting level of asthma control.
 - Candidate variables are shown in Table 1.

Table 1. Candidate Variables Entered into Model for Adult and Children

<ul style="list-style-type: none"> Age Gender Race/ethnicity Highest level of education completed Employment status of adult or caregiver if child 2007 household income Type of insurance coverage Respiratory-related visit or not Self-reported asthma severity Smoking status* Exposed to second-hand smoke BMI > 30 	<ul style="list-style-type: none"> Cold, flu, sinus infection in previous 4 weeks* Presence of GERD or acid reflux or chronic heartburn in the past 12 months* Presence of nasal or skin allergies, ear infection* or strep throat* in past 12 months Asthma medication adherence Visit to asthma specialist in past 12 months Asthma exacerbation in past 12 months Medication for nasal allergies in past 4 weeks
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GERD = Gastroesophageal reflux disease.
*Adult model only (not asked in children questionnaire).
*Children model only (not asked in adult questionnaire).

- Candidate variables were removed from the model during the selection process if $P > 0.05$.
- Race/ethnicity, gender, and age were forced into the model without regard to their statistical significance

RESULTS

- Of the 2,238 adult asthma patients enrolled, 1,317 (58.8%) had uncontrolled asthma.
- Of the 2,429 pediatric asthma patients, 1,207 (49.7%) had uncontrolled asthma.
- Key demographic and medical history results are shown in Tables 2 and 3 for adults and children.

Table 2. Demographics

	Adult n = 2,238	Children n = 2,429
Age (years), Mean (95% CI)	46.7 (46.0-47.3)	9.2 (9.1-9.4)
Gender, female	1,601 (72%)	1,055 (44%)
Race/ethnicity		
Non-Hispanic white	1,483 (68%)	938 (39%)
Non-Hispanic black	262 (12%)	524 (22%)
Hispanic (regardless of color)	246 (11%)	720 (30%)
Non-Hispanic other	206 (9%)	206 (9%)
Education classification		
No high school diploma	143 (7%)	345 (15%)
High school diploma	960 (44%)	1,038 (44%)
Associate's or bachelor's degree	762 (35%)	682 (29%)
Master's, professional, doctoral	342 (16%)	321 (14%)
Employed (adult or caregiver if child)	1,442 (66%)	1,541 (64%)
2007 household income		
Less than \$34,999	618 (28%)	885 (38%)
\$35,000 to \$89,999	808 (37%)	574 (24%)
> \$90,000	396 (18%)	423 (18%)
Did not answer	369 (17%)	480 (20%)
Insurance coverage		
Private	1,615 (73%)	1,059 (44%)
Medicaid	172 (8%)	1,113 (48%)
Medicare	221 (10%)	NA
Other	108 (5%)	192 (8%)
No insurance coverage	90 (4%)	34 (1%)

NA = not available

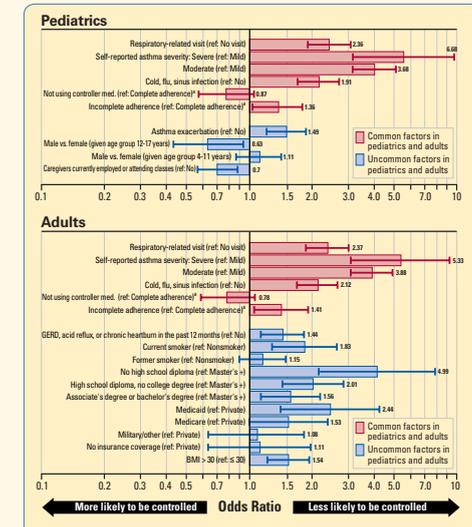
Table 3. Medical History

	Adult n = 2,238	Children n = 2,429
Respiratory-related visit	861 (40%)	1,021 (45%)
Asthma severity		
Mild	1,061 (49%)	1,234 (52%)
Moderate	971 (45%)	1,012 (42%)
Severe	137 (6%)	152 (6%)
Smoking classification		
Nonsmoker	1,262 (58%)	NA
Former smoker	627 (29%)	NA
Current smoker	303 (14%)	NA
Exposed to second-hand smoke	387 (18%)	358 (15%)
BMI, Mean (95% CI)	31.0 (30.7 - 31.3)	20.5 (20.3-20.8)
BMI > 30	1,043 (49%)	152 (8%)
Cold, flu, sinus infection in previous 4 weeks*	1,249 (56%)	1,652 (69%)
Presence of GERD or acid reflux or chronic heartburn in the past 12 months	782 (35%)	NA
Presence of nasal or skin allergies, ear infection* or strep throat* in past 12 months	1,562 (71%)	2,038 (85%)
Visit to asthma specialist in past 12 months	398 (18%)	521 (22%)
Asthma exacerbation in past 12 months	764 (34%)	1,006 (42%)
Medication for nasal allergies in past 4 weeks	1,128 (51%)	1,195 (50%)

*Children only.

- Results from the final adult and pediatric model are shown in Figure 5.

Figure 5. Model Results*



*Age, gender, and race/ethnicity are not shown in the figure when they are not significant. However, they are included in the model regardless of significance.
ref = reference.
*Based on a nonvalidated subjective measure of adherence.

CONCLUSIONS

- These two studies indicate several factors are common in both adults and children in predicting uncontrolled asthma:
 - Self-rated asthma severity
 - Recent history of cold, flu, or sinus infection
- Some factors were significant predictors only for adults:
 - Smoking status
 - Education level
 - Type of insurance
 - BMI
- Other factors were significant predictors only for children:
 - Age and gender interaction
 - Employment status
- Identifying possible predictors of uncontrolled asthma in adults and children will help PCPs identify asthma patients who may be at higher risk and may need additional education or intervention to control their asthma.

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CONFLICT OF INTEREST STATEMENT

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