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## **Asthma as a Risk Factor for Invasive Pneumococcal Disease**

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lustrated the complexity and clinical utility of contrasting adherence patterns.

**CONCLUSIONS.** Monitoring long-term controller medication adherence may be more predictive of morbidity than quick-relief medication use except in outlier cases, in which monitoring both medication types may be valuable for clinical and empirical purposes.

**REVIEWER COMMENTS.** Medication adherence has long been identified as a key factor in overall asthma outcome. For example, self-reporting quick-relief and long-term controller medication use, canister weighing, pharmacy records, and electronic monitoring have all been used to assess medication adherence. Of these methods, electronic monitoring, which is the most costly and technologically complex, is generally accepted as the most accurate method for monitoring adherence. Inadequate daily medication adherence has been widely documented in patients with asthma and has been linked to morbidity and increased health care costs. Although it was not surprising that nonadherence to long-term controller medications was common in this investigation, it was very interesting that no statistically significant relationship was found between adherence with quick-relief and long-term controller medication classes. For example, the investigators' hypothesis that quick-relief and long-term controller medication use would demonstrate an inverse relationship (eg, higher long-term controller medication use corresponding to lower reliance on quick-relief medications) was not confirmed. The investigators suggest that novel strategies to enhance appropriate medication use, such as better tracking the use of long-term controller medications and providing feedback regarding actual use, may be effective in improving adherence in asthma patients.

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### **Asthma as a Risk Factor for Invasive Pneumococcal Disease**

Talbot TR, Hartert TV, Mitchel E, et al. *N Engl J Med*. 2005;352:2082–2090

**PURPOSE OF THE STUDY.** To determine if asthma is a risk factor for invasive pneumococcal disease.

**STUDY POPULATION.** Patients 2 to 49 years of age in a Tennessee Medicaid program (TennCare) with >1 year of continuous enrollment during the study period (1995–2002). For each patient with invasive pneumococcal disease, 10 age-matched controls were chosen. A total of 11 counties in Tennessee with a population of 2.8 million participated in the study. Asthma was defined as  $\geq 1$  inpatient diagnoses (admission or emergency depart-

ment visit),  $\geq 2$  outpatient diagnoses, or use of asthma-related medications. High-risk asthma was defined as an admission for asthma, an emergency department visit, long-term use of oral steroid, or use of  $\geq 3$  short-acting  $\beta$  agonists per year.

**METHODS.** Invasive pneumococcal disease was defined as isolation of strep pneumonia from a normally sterile site (eg, blood, cerebrospinal fluid, pleural fluid, surgical aspirate, joint fluid, and/or bone). The organisms were serotyped.

**RESULTS.** A total of 635 patients with invasive pneumococcal disease and 6350 controls were identified. A total of 18% (114 patients) with asthma had an invasive infection compared with 8.1% (516 patients) in the control group. Patients with asthma had increased risk of invasive disease (odds ratio: 2.4; 95% confidence interval: 1.9–3.1). In patients with high-risk asthma, the annual risk for invasive disease was 4.2 of 10 000 compared with 2.3 of 10 000 in the low-risk asthma group and 1.2 of 10 000 in the control group.

**CONCLUSIONS.** Asthma is an independent risk factor for invasive pneumococcal disease.

**REVIEWER COMMENTS.** The risk of invasive disease did not depend on comorbid conditions or advancing age. This is the first study to show the association and, if upheld with further data, will significantly affect our recommended immunization strategy for patients with asthma.

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### **Exercise-Induced Dyspnea in Children and Adolescents: If Not Asthma Then What?**

Abu-Hasan M, Tannous B, Weinberger M. *Ann Allergy Asthma Immunol*. 2005;94:366–371

**PURPOSE OF THE STUDY.** Exercise-induced asthma (EIA) is the most commonly recognized cause of exercise-induced dyspnea (EID) in children and adolescents. However, EID in otherwise healthy children and adolescents may have other causes besides asthma. The purpose of this study is to report the outcome of evaluations for EID when other signs and symptoms of asthma were absent or there was no response to previous use of an inhaled  $\beta_2$  agonist.

**STUDY POPULATION.** One hundred forty-two patients, 6 to 21 years old (mean: 14 years), with EID were studied.

**METHODS.** In this retrospective study, investigators reviewed the results of all exercise tests performed in otherwise healthy patients with EID between 1996 and 2003. Physiologic measures assessed included preexer-

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